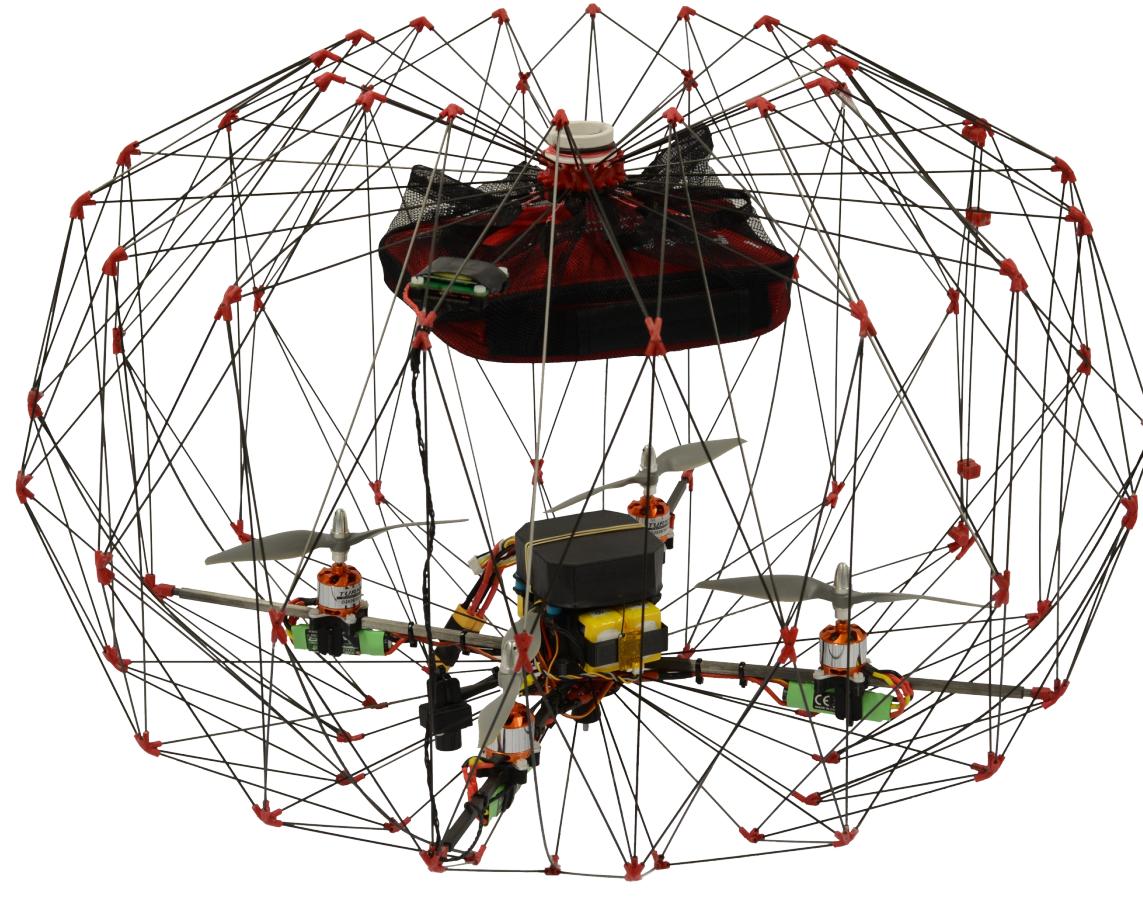


Project Manager @ DRONISTICS



Medical Delivery Drones

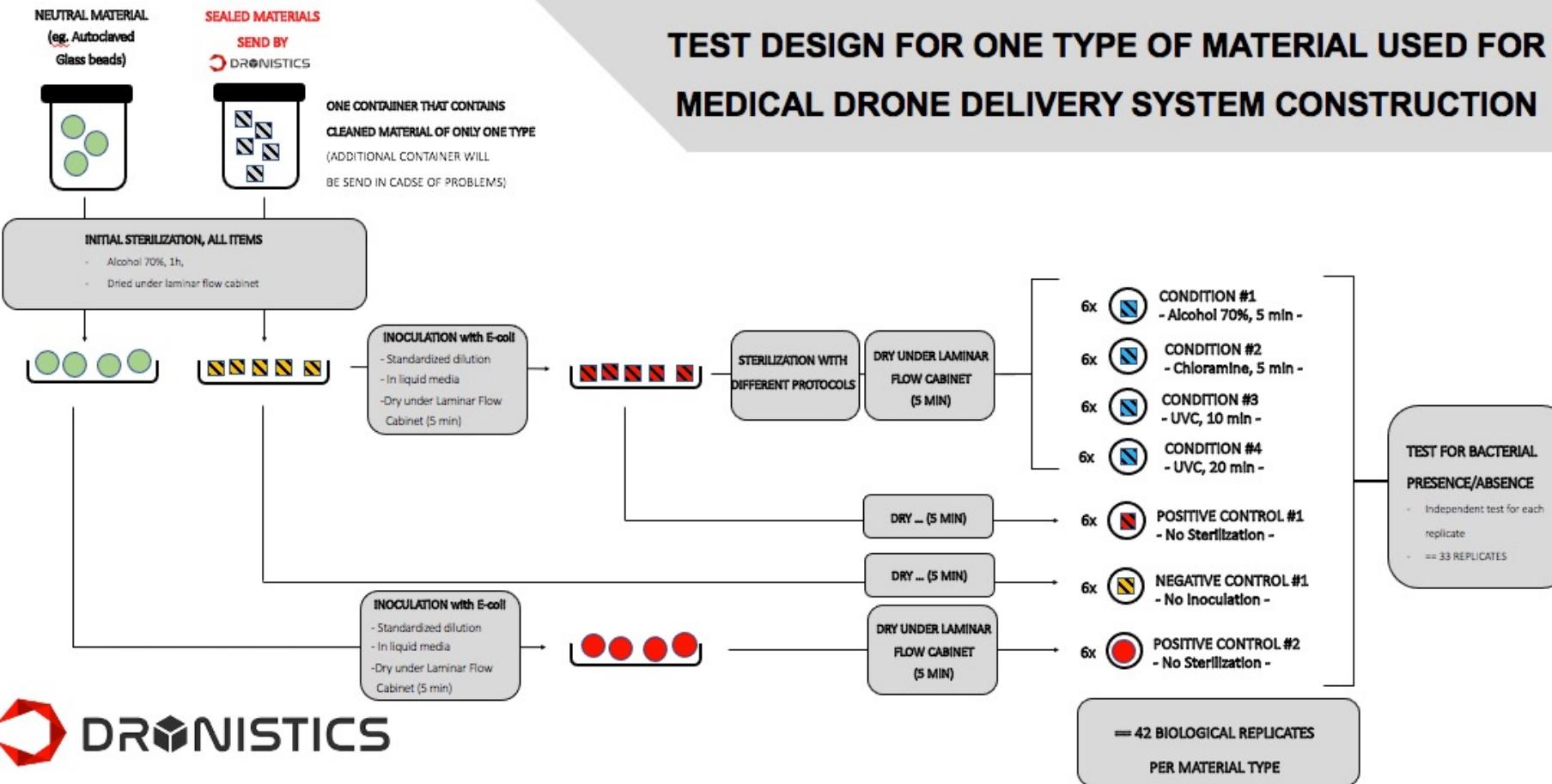


Experiment
Design

Project & Team
Management

Data
Analysis

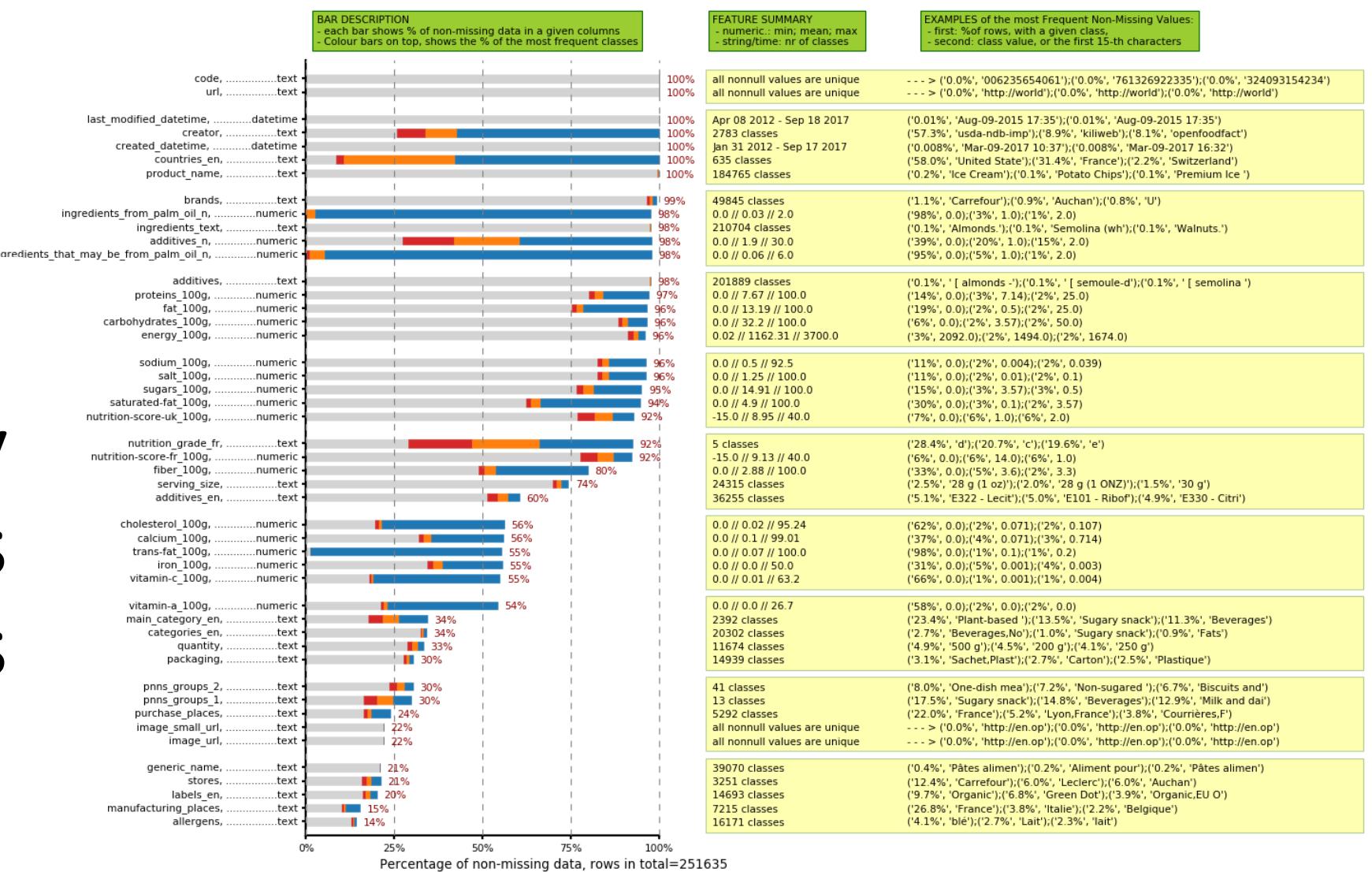
MY WORK



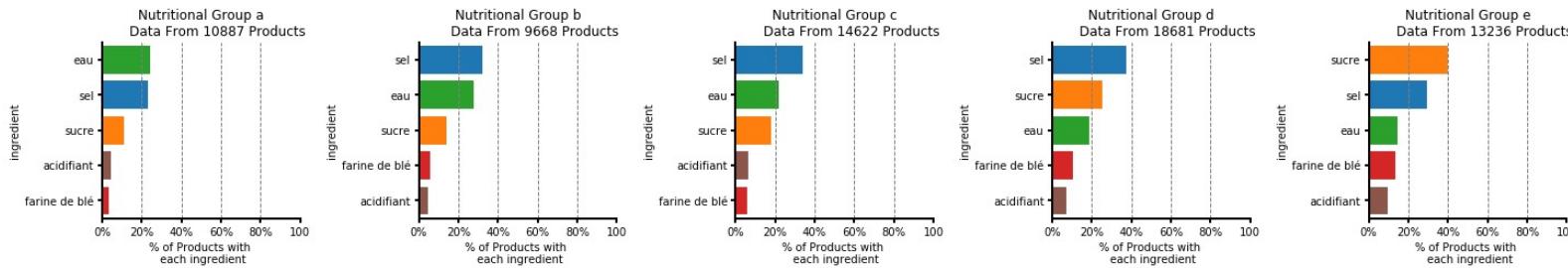
I led R&D team
@ King's College
London on adapting
drone maintenance
procedures to
requirement from
hospitals, & rescue
services.

Data Frame Explorer

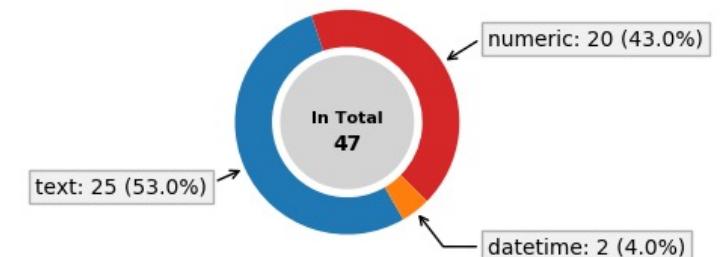
Fast summary
for hundreds
of features



Find Trends

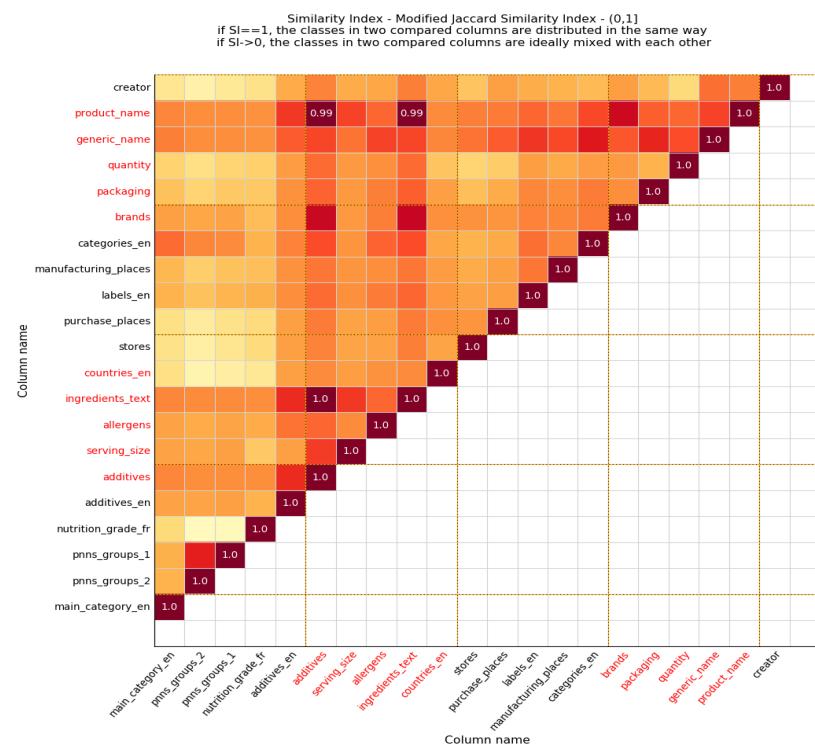


Column number with each data type

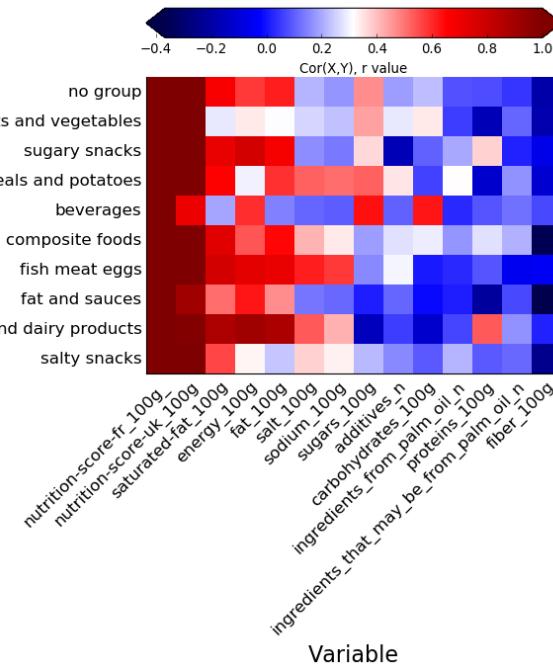


... duplicates

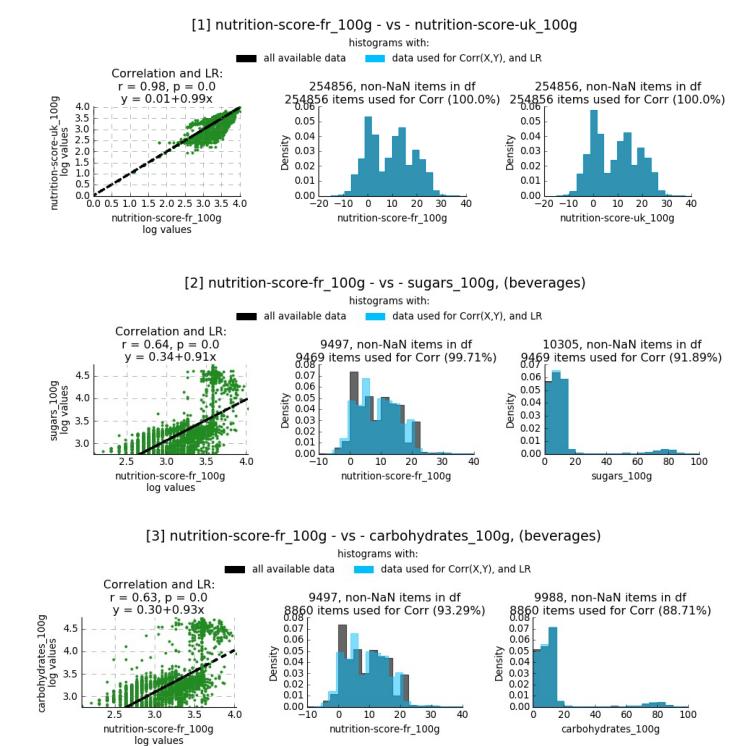
and correlations



PNNS group



Variable



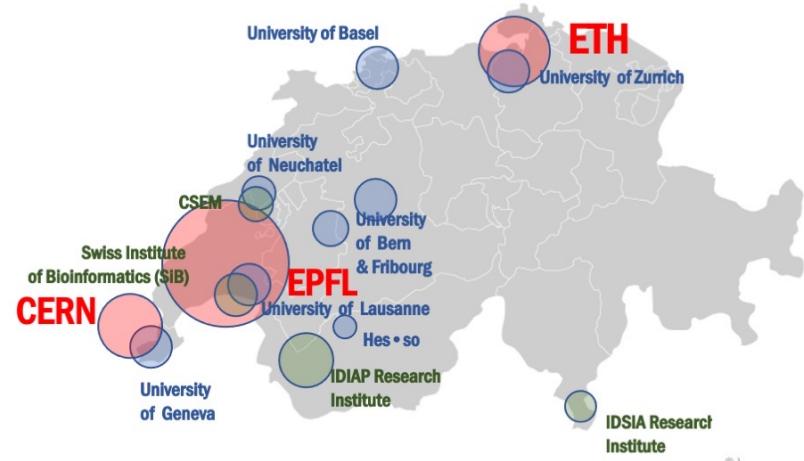
I created SwissAI *one of the largest AI communities in Europe*



2500 MEMBERS

Swiss AI

Research centers



>200 companies
and institutions

including



Meetups
Courses
Workshops

Interviews
Consulting
Mentoring

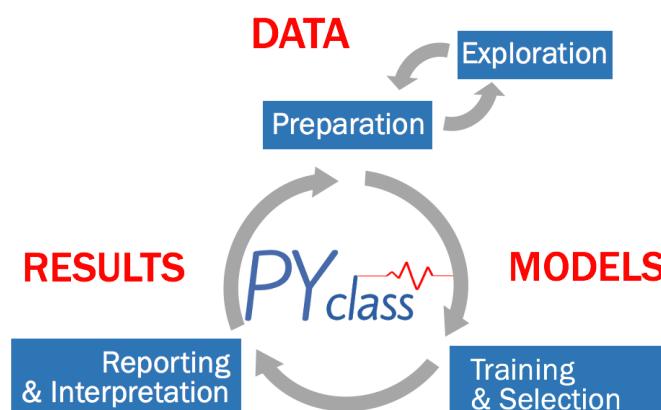
www.SwissAI.org



Responsible for

- project vision
- product dev.
- Team of 3 Developers & 11 Advisors

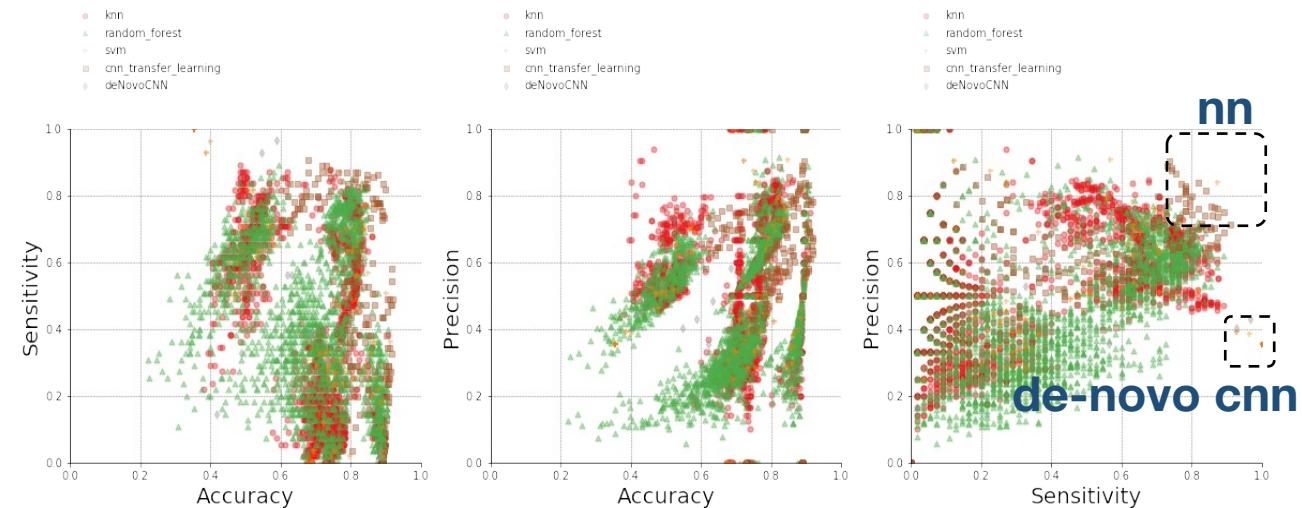
Backbone of systems using medical images



Evaluated

- 5000+ Models
- Several Datasets

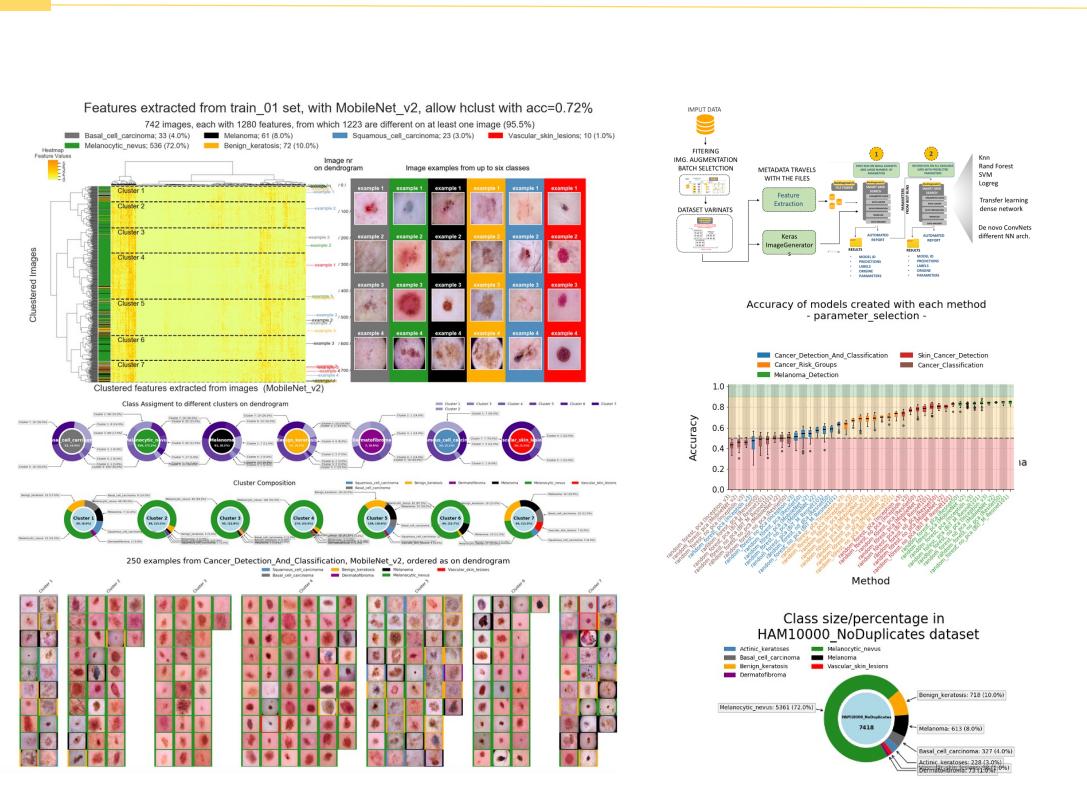
Accuracy, Sensitivity and Precision of predictions made with 5 model types, plotted against each other



Early Detection of Skin Cancer with Low-cost Devices

The mobile application interface for SkinDiagnosticAI includes:

- Top Bar:** "SkinDiagnosticAI" and "Skin images classified based on their similarity and classified using AI systems". A legend indicates: Low-Risk of Cancer (green), Medium Risk of Melanoma (yellow), and High Risk of Melanoma cancer (black).
- Middle Section:** A grid of skin lesion images with their classification status (e.g., green border for low risk).
- Bottom Section:** "Detailed Classification" section showing a dendrogram and pie charts for cluster composition.
- Right Side:** Two examples of skin images with their classification status (Low risk or High risk) and dates (2021.01.01 and 2021.01.06).
- Buttons:** "Know More" and "Get Help" for each example.



Created PYclass

Classification of Medical Images

Model Accuracy

Diagnostic Purpose

Value Proposition

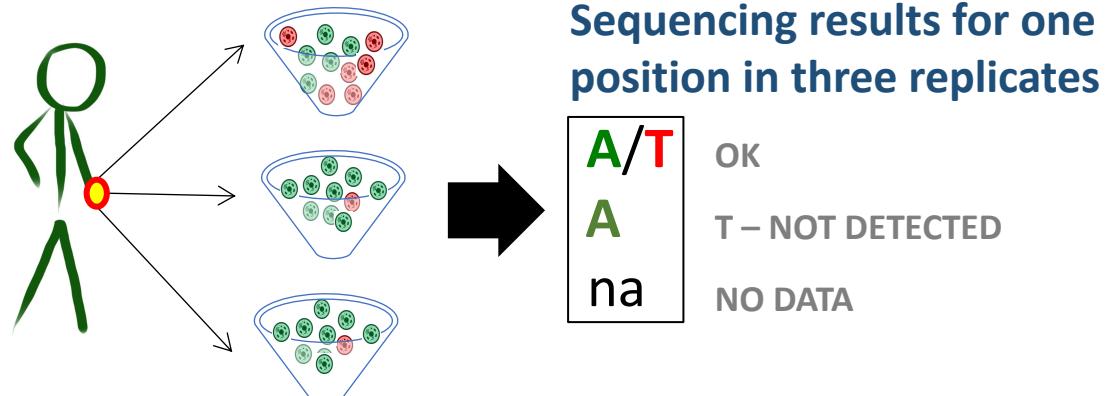
Business Model



Detection and quality evaluation of genetic markers

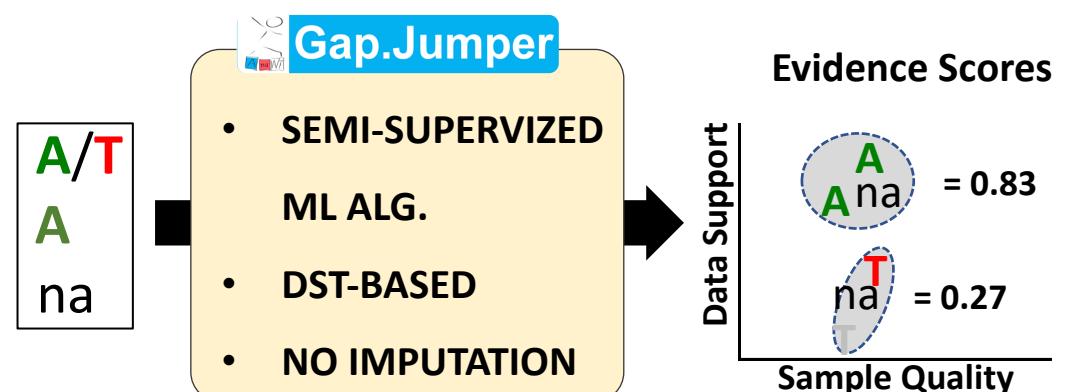
THE PROBLEM

Even samples taken from the same source
may give different results



MY SOLUTION

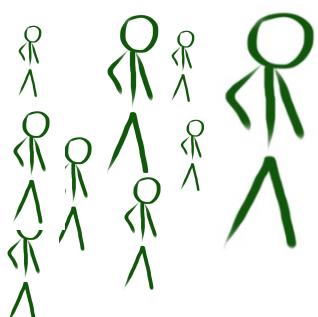
I implemented the approach that is used for decision making in drones & planes



NEW POSSIBILITIES FOR

- Using data from many sources
- Selection of Genetic Markers
- Support for other methods

Control Group



Data		
Position	1	2
1	A	-
2	-	A/G
3	T	T
.	.	.

millions

$$\left\{ \begin{array}{l} G == \text{MUTATION (0.37)} \\ A == \text{NO CHANGE (0.56)} \end{array} \right.$$

Patient



Data		
Position	1	2
1	A	-
2	-	A/G
3	T	T
.	.	.

millions

Position	Consensus
1.	A (0.7); G (0.2)
2.	A (0.1); G (1.0)
3.	; T (1.0)
.	;

*based only on empirical data
& samples quality*

CREATED AS PRODUCT

- Extensive manual & tutorial
- Promoted it in a community
- Prepared to deploy in private company

www.SimpleAI.ch



FONDS NATIONAL SUISSE
DE LA RECHERCHE SCIENTIFIQUE





Paweł Rosikiewicz

Lead Researcher in multi-stage project

Created Entire System for production & identification of microorganisms used as biofertilizers

LABOLATORY

MOLECULAR BIOLOGY
& BIOINFORMATICS

DATA ANALYSIS

MY ROLE



DESIGN



PROTOCOL DEV.



MANAGED LAB TEAM



NGS SEQUENCING



PRIMARY ANALYSIS



GENETICS

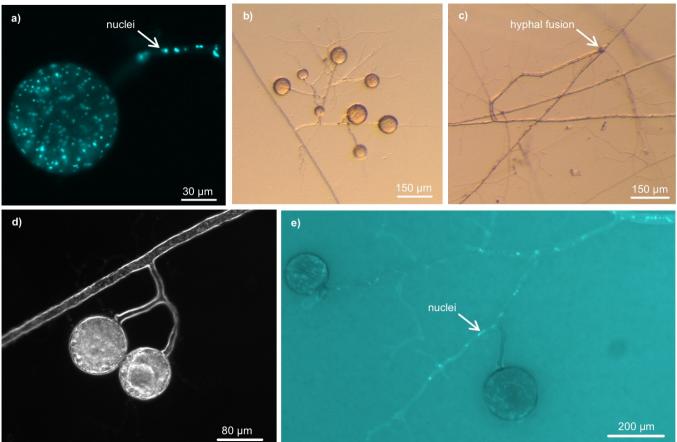


CUSTOM PIPELINES

MY PROJECT

MY MAIN EXPERIMENT

- Took 5 years
- >25.000 bio-samples
- 3TB of raw data

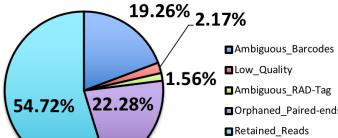


Sequencing



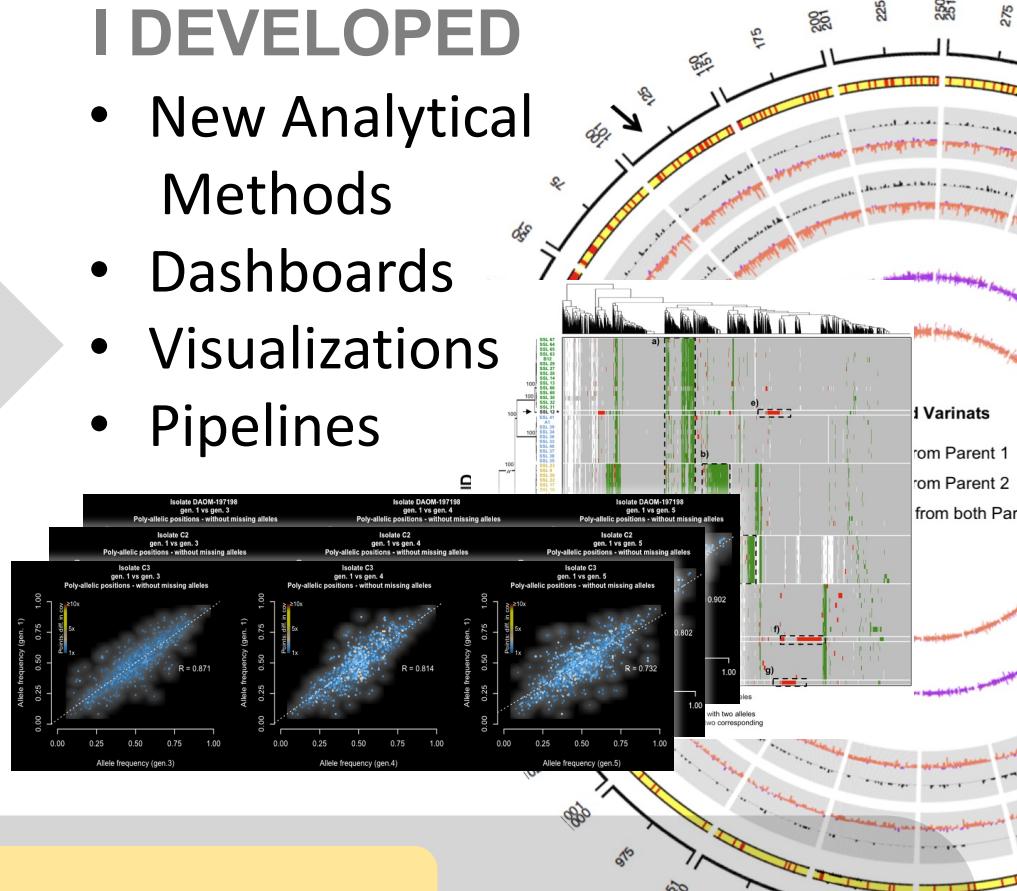
Variant Calling*

Quality Filtering



I DEVELOPED

- New Analytical Methods
- Dashboards
- Visualizations
- Pipelines



PRODUCTS GENERATED WITH MY PROJECT

IMPACT

MY IN VITRO
CULTURE SYSTEM

IMPLEMENTED IN
INDUSTRY Fig.1

NGS PROTOCOL

USED OVER 6000x

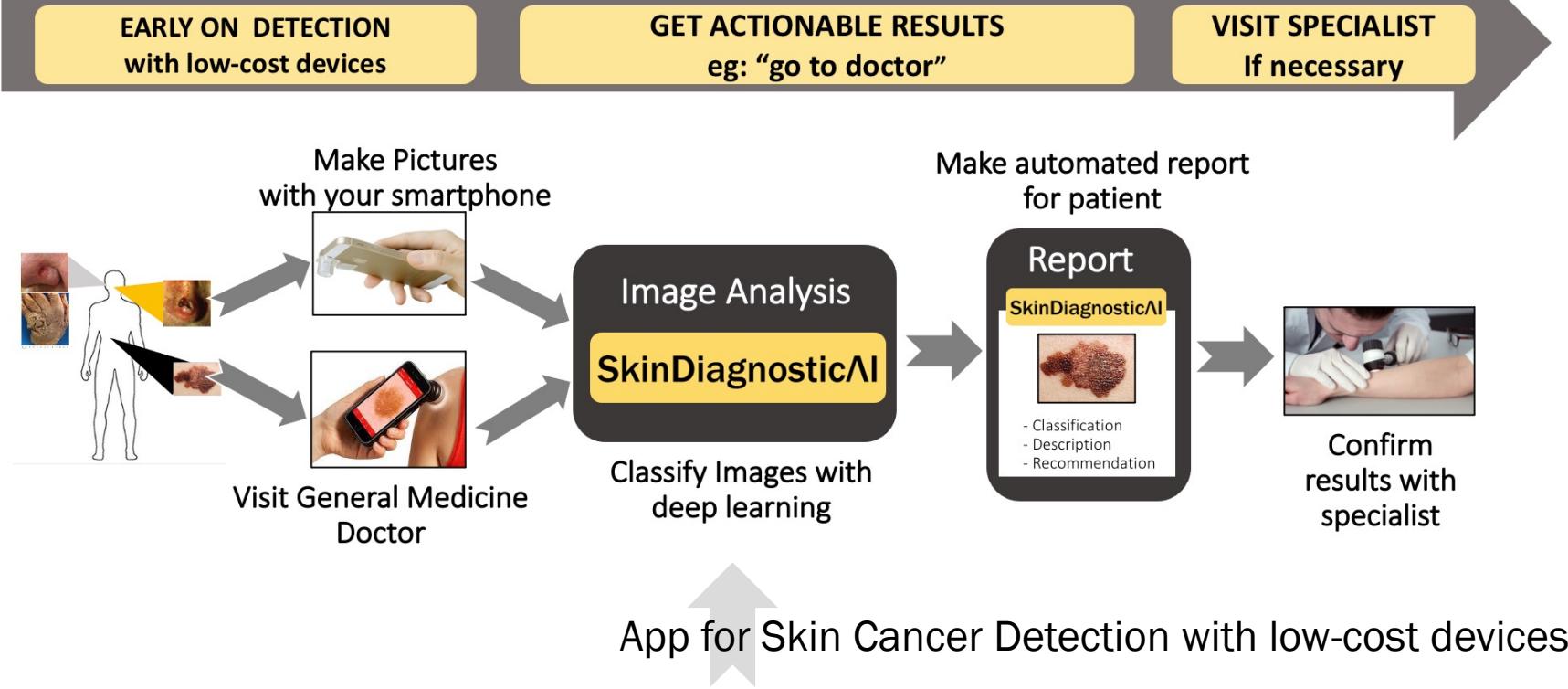
60 STRAINS
OF MICROORGANISMS

TESTED FOR USE IN
AGRONOMY

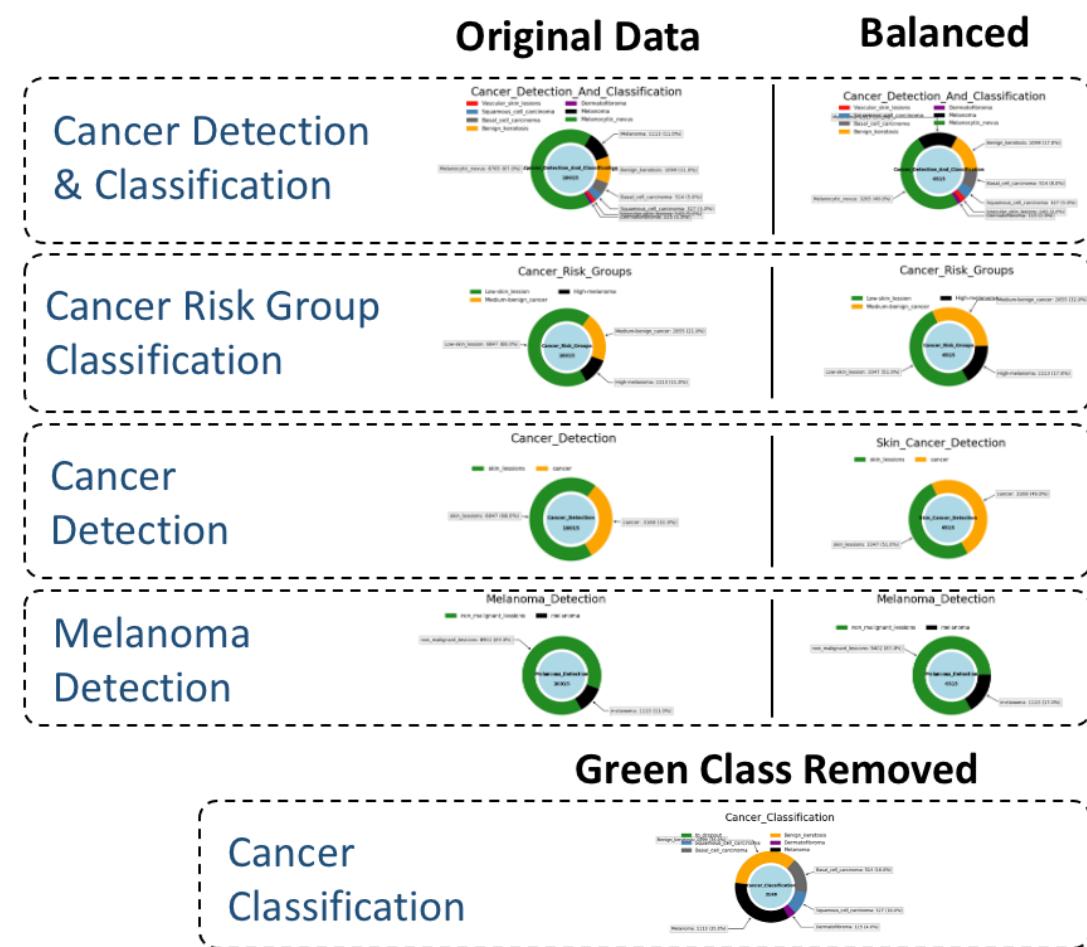
SkinDiagnosticAI

App for Skin Cancer Detection with low-cost devices

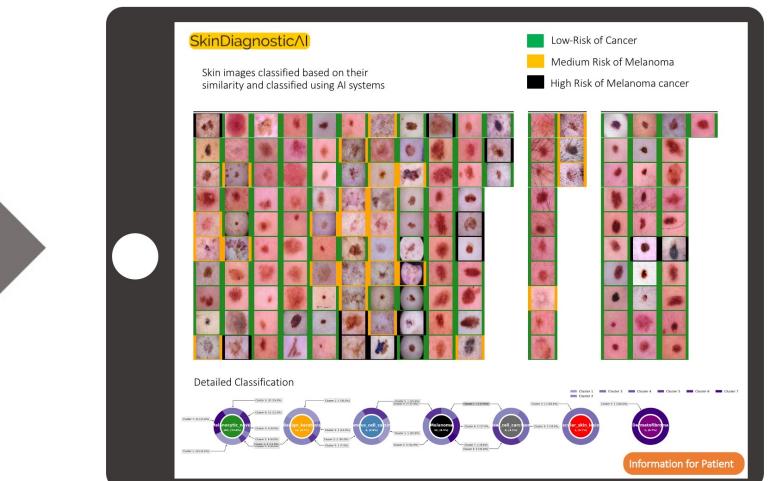
PRODUCT IDEA



FEASIBILITY STUDY



- Class Description**
- 7 Classes,
 - 5 cancer Types
 - 2 Classes of Skin Lesions
 - 3 Classes,
 - Low. Medium and High Malignant Risk Cancer
 - 2 Classes,
 - Cancer Positive or Negative
 - 2 Classes,
 - Melanoma Positive or Negative
 - 5 Classes with different Cancer types



Diagnostic Purpose

- Simultaneously Detects and Classifies most common skin lesions and cancer types
- Provides information on the risk of malignant cancer based on its resemblance to known examples
- Model Used to inform whether the skin lesion may be of cancer origin
- Detects most dangerous skin cancer type
- Used to classify previously diagnosed cancer skin lesions into specific cancer type

SkinDiagnosticAI

App for Skin Cancer Detection with low-cost devices



PROJECT

- Open-Source Software (GNU License, or other available on request)
- ~ 7 months to create **two products** (after-work time)

SkinDiagnosticAI

- proof of concept

PYclass

- MVP -

AI workbench for Classification Model Testing Medical Image Data

TEAM

- **3 developers**
 - Medical AI & Data Science
 - Bioinformatics
 - Biz Dev. & Services
 - Cloud infrastructure
- **8 advisors**
 - Domain Knowledge (2)
 - AI (1)
 - QMS for Medical Devices (1)
 - Marketing on Med. Market (1)
 - IT solutions (1)
 - Brand protection (1)
 - AI Product Dev (1)

PARTNERS



SimpleAI
projects

MY ROLE

- Product Owner
- Lead Developer @ PYClass
- Data Sc. @ SkinDiagnosticAI

SwissAI.org

Technical goals

Define MVP requirements

What product to build?

Deploy it on the cloud

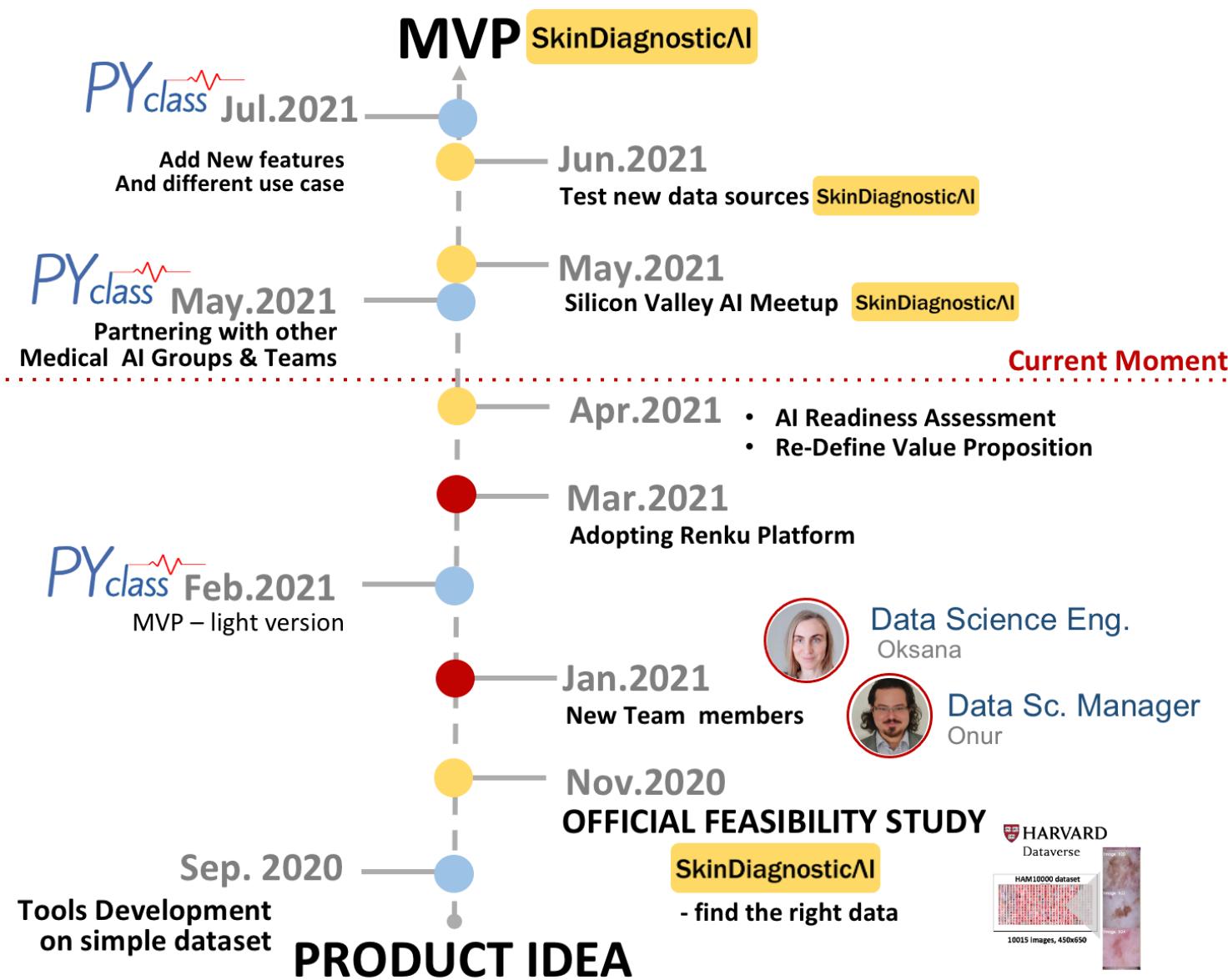
What model & data to use?

Improve the design

What features are important?

Build The Product

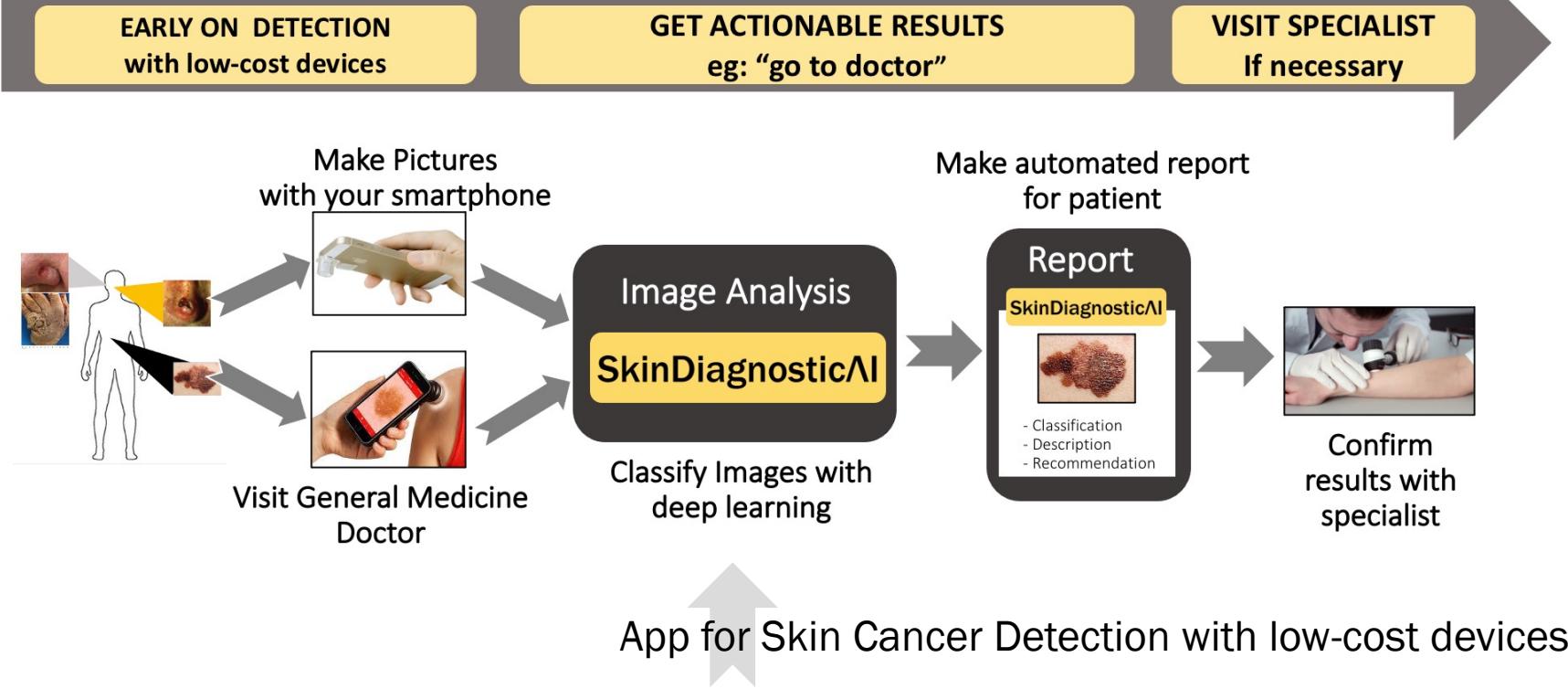
How to do it fast?



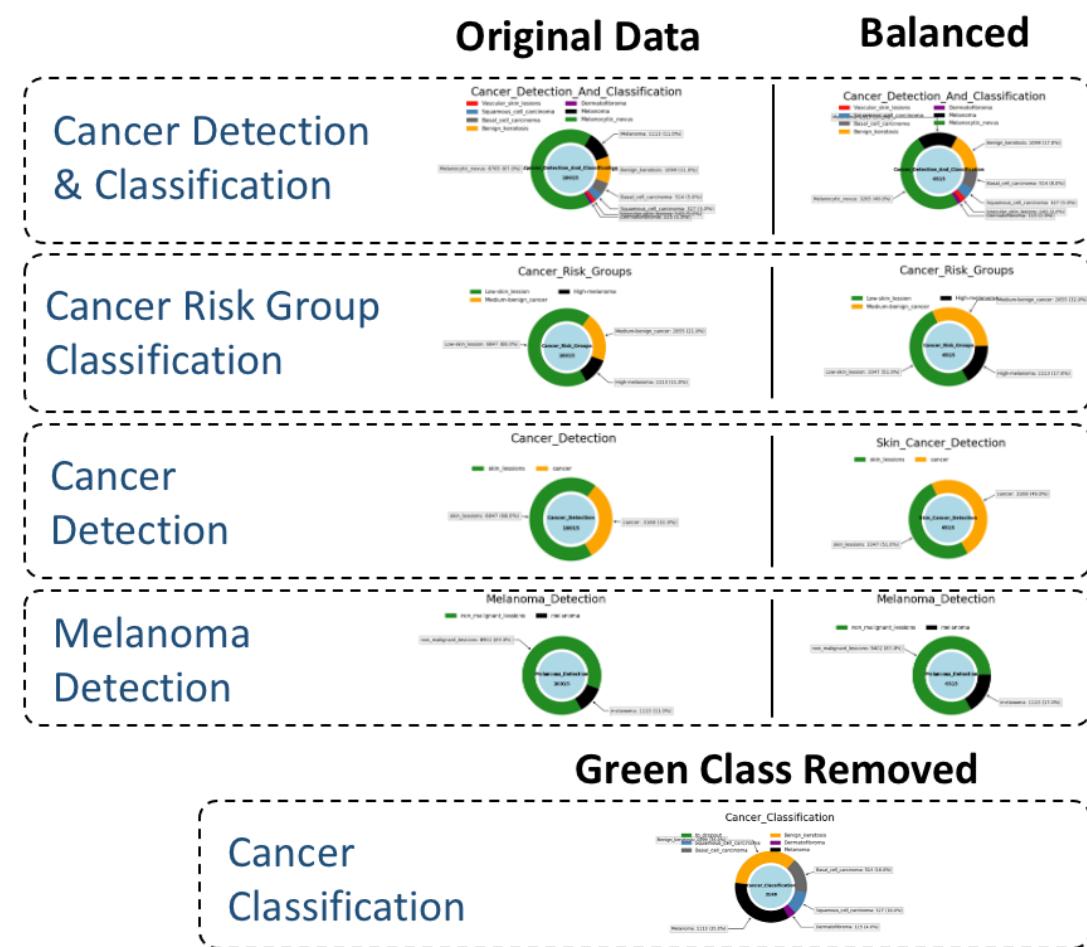
SkinDiagnosticAI

App for Skin Cancer Detection with low-cost devices

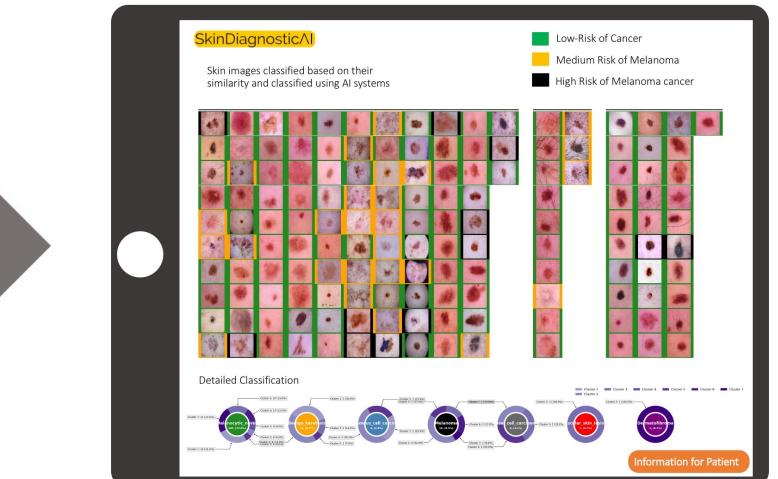
PRODUCT IDEA



FEASIBILITY STUDY



- Class Description**
- 7 Classes,
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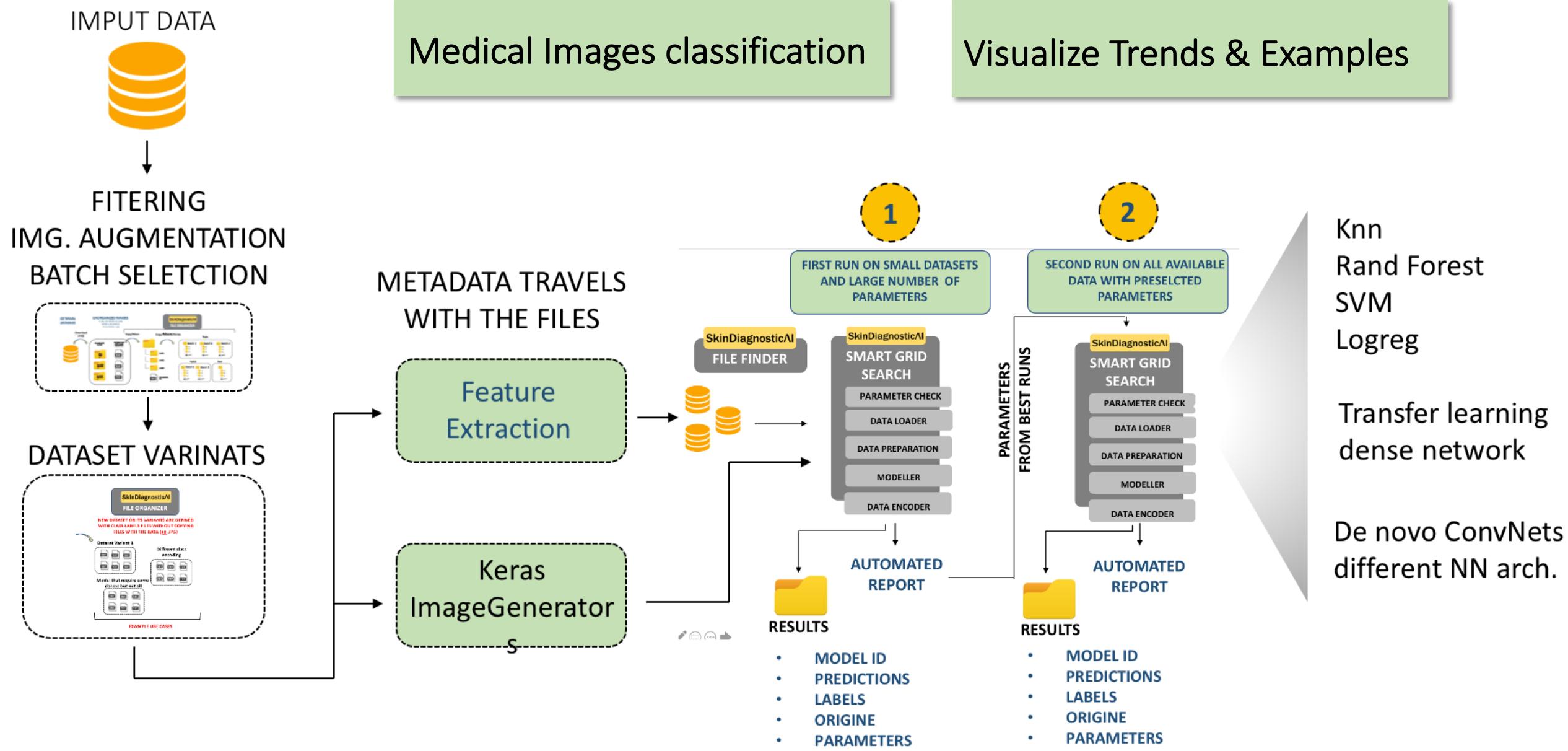
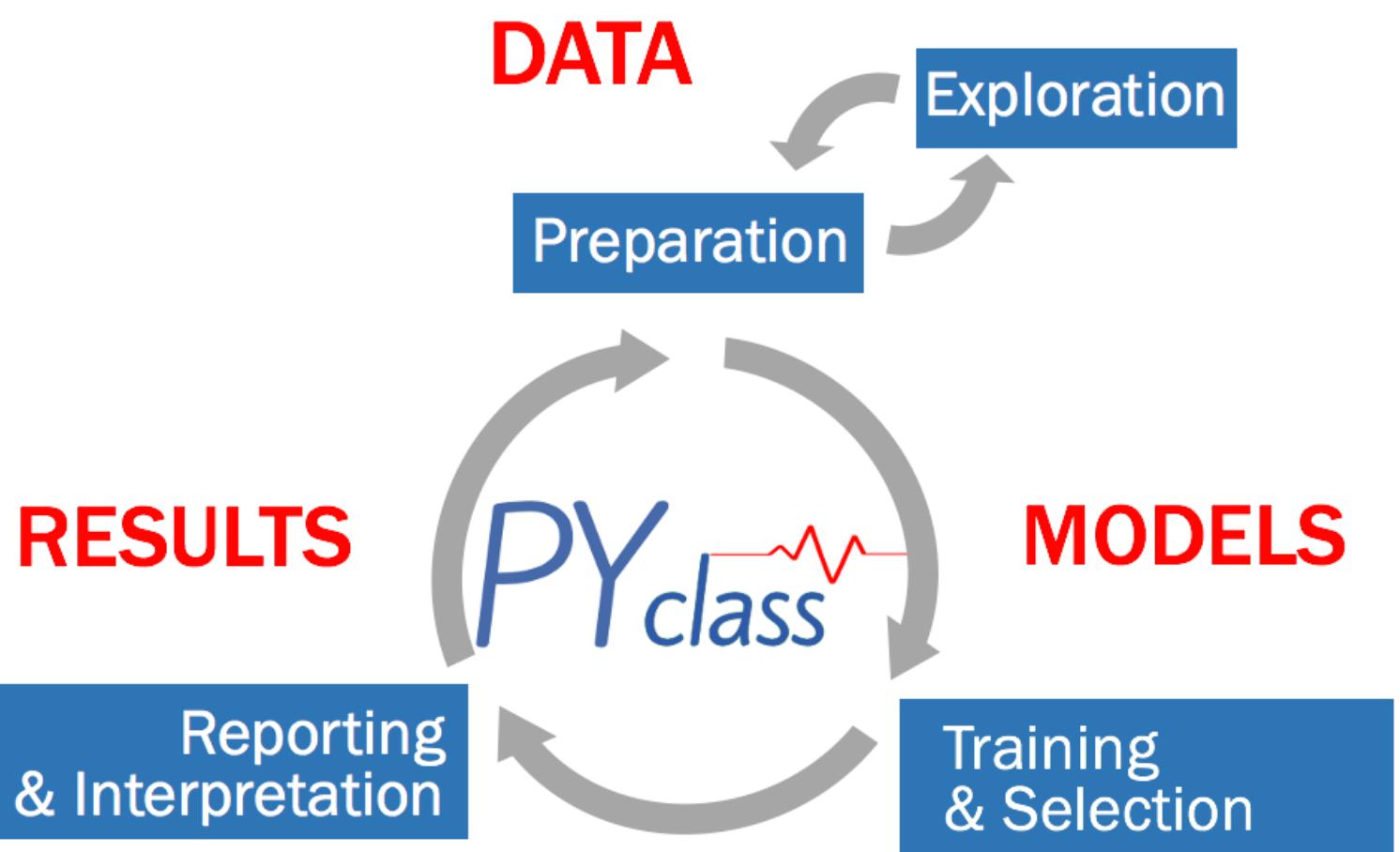
Diagnostic Purpose

- Simultaneously Detects and Classifies most common skin lesions and cancer types
- Provides information on the risk of malignant cancer based on its resemblance to known examples
- Model Used to inform whether the skin lesion may be of cancer origin
- Detects most dangerous skin cancer type
- Used to classify previously diagnosed cancer skin lesions into specific cancer type



AI workbench for Analysis
of Medical Images

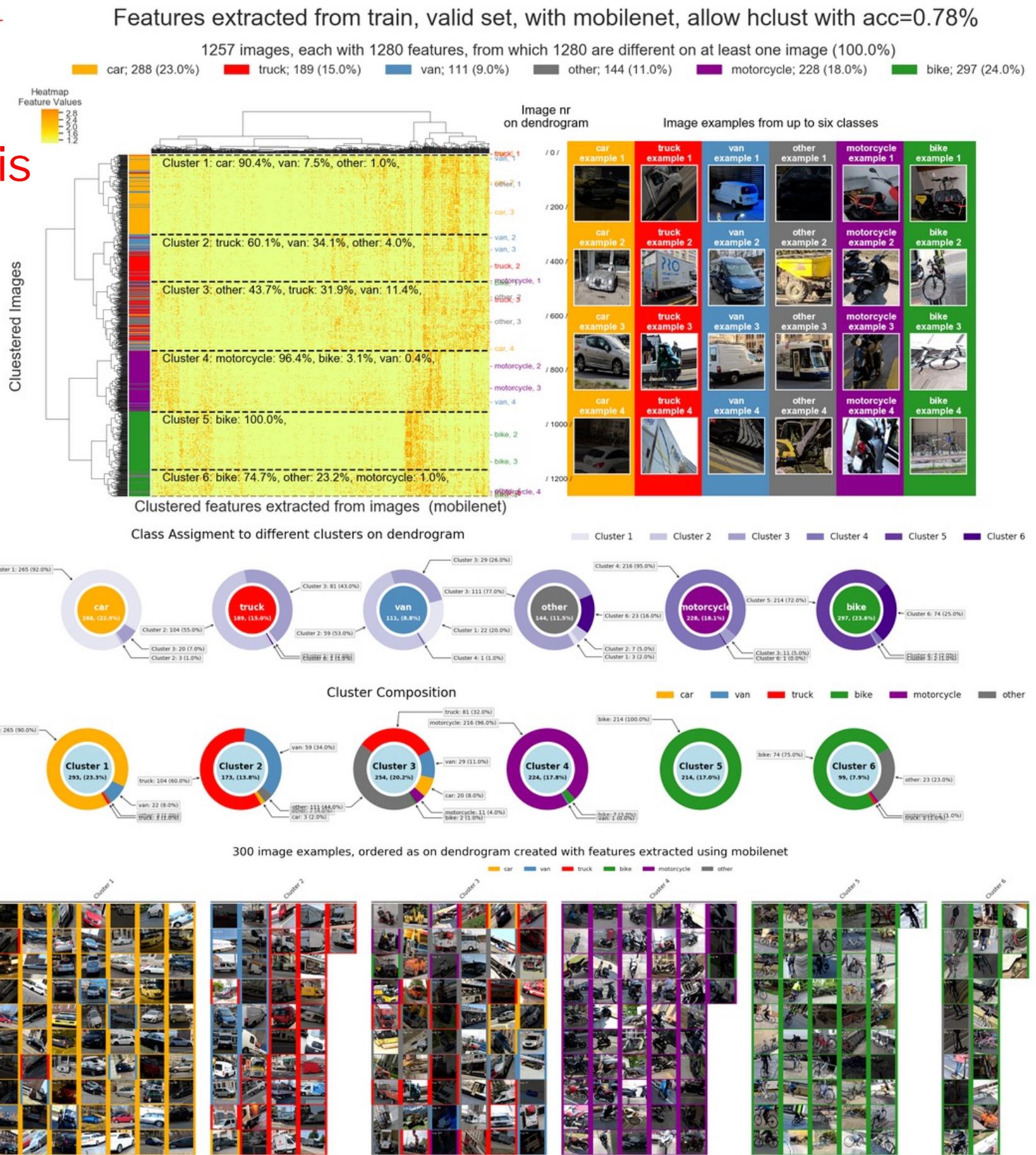
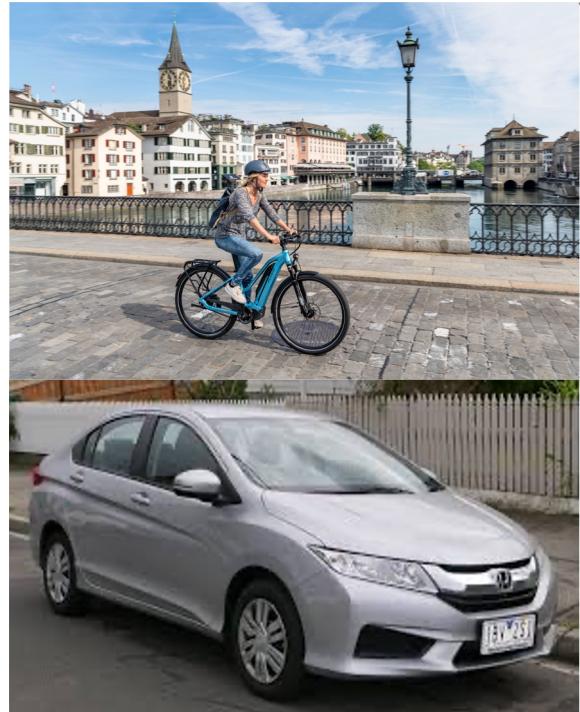
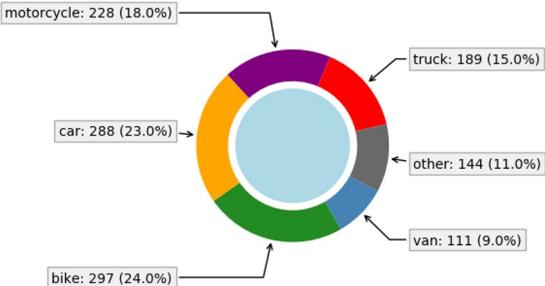
Easy interpretation



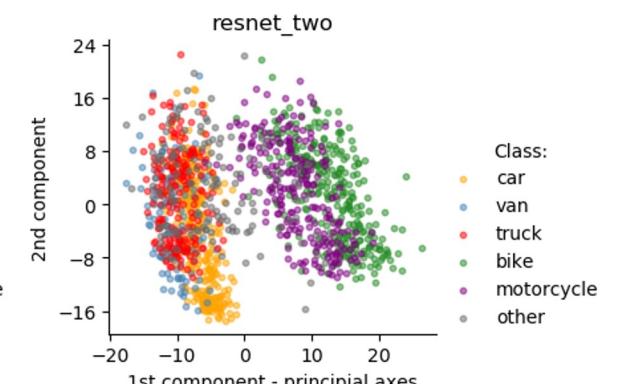
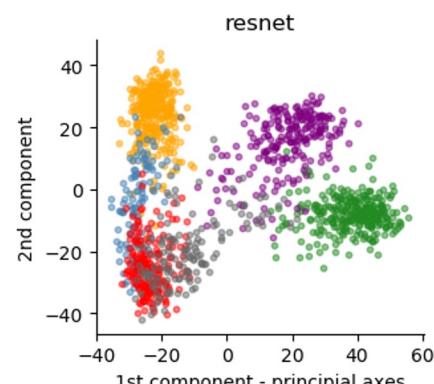
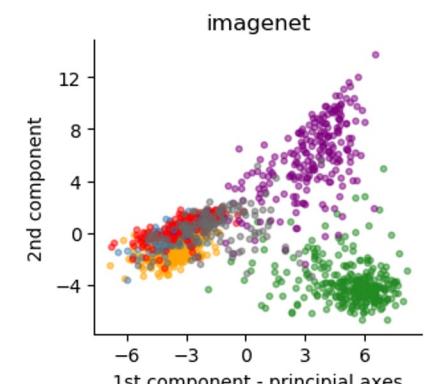
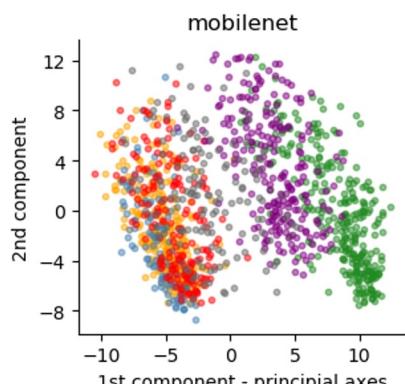


AI workbench for Analysis of Medical Images

Swissroads Dataset Composition
- including augmented images -

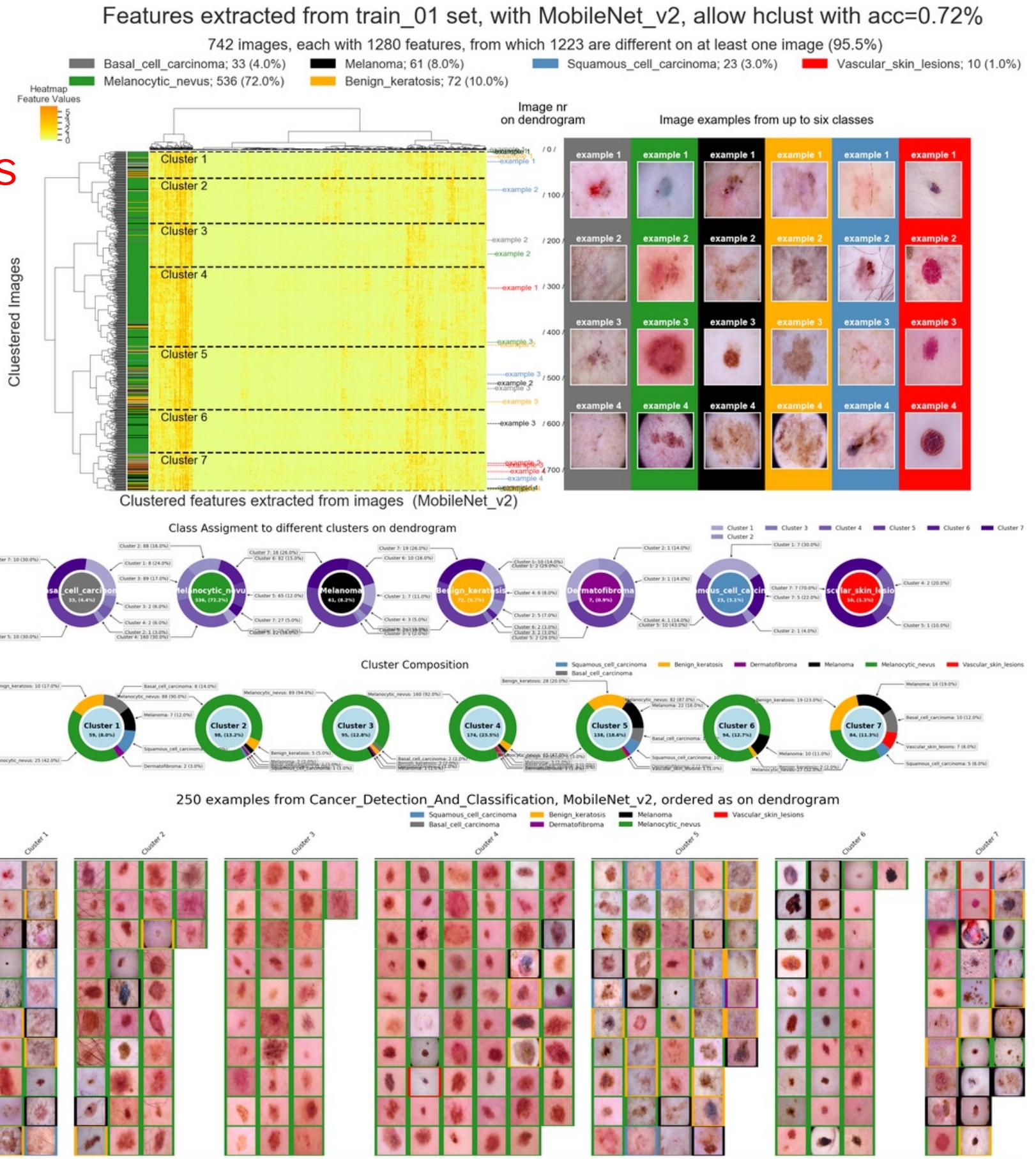
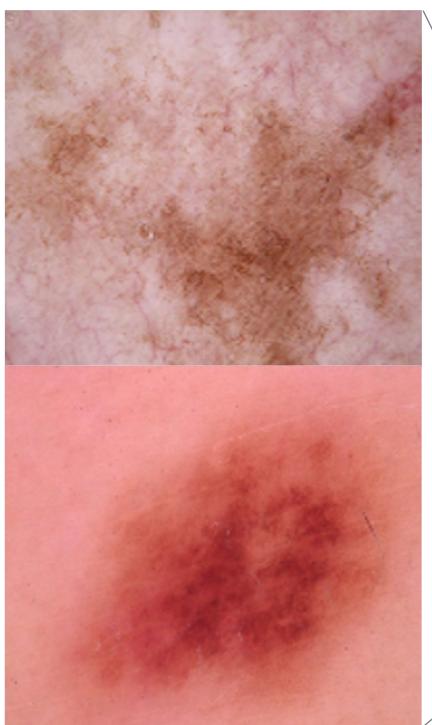
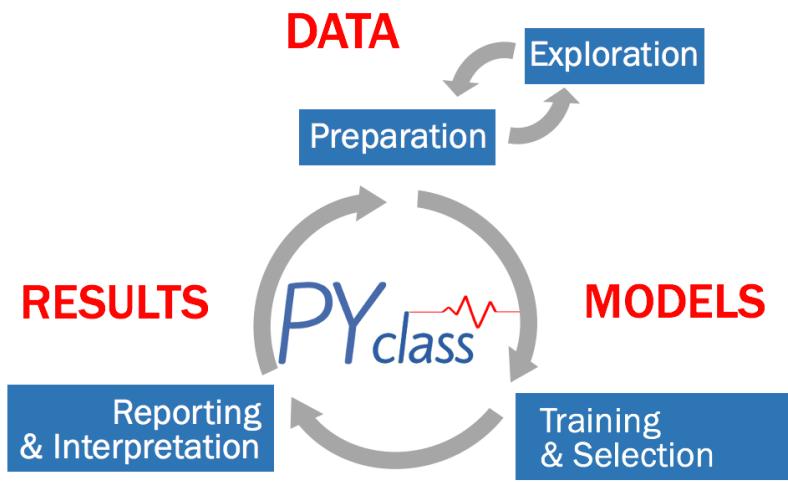


PCA: visualization of extracted features using the first two principal components

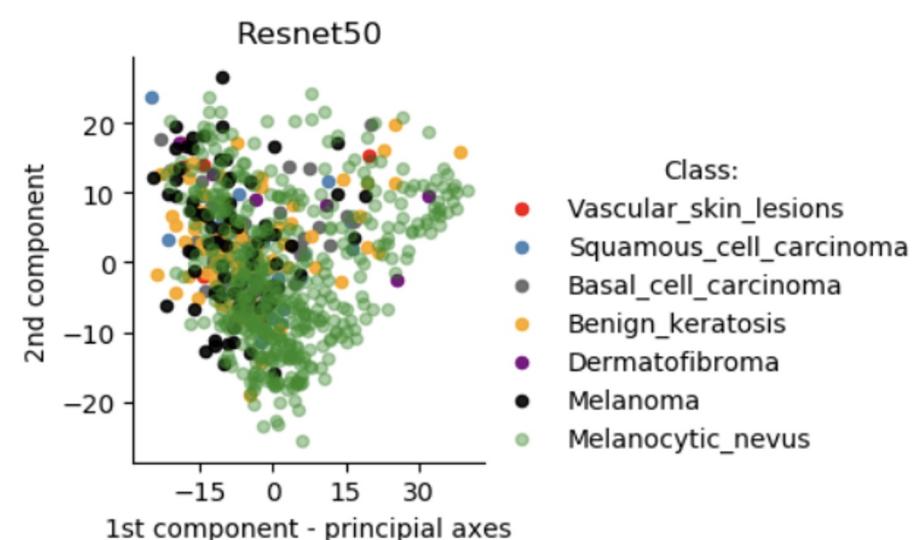
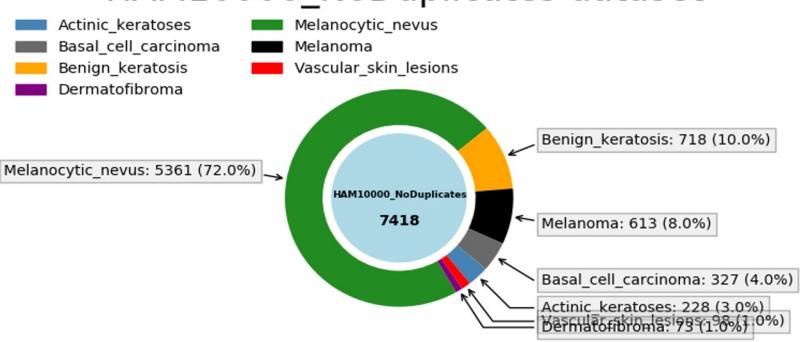


PYclass

AI workbench for Analysis of Medical Images



Class size/percentage in HAM10000_NoDuplicates dataset



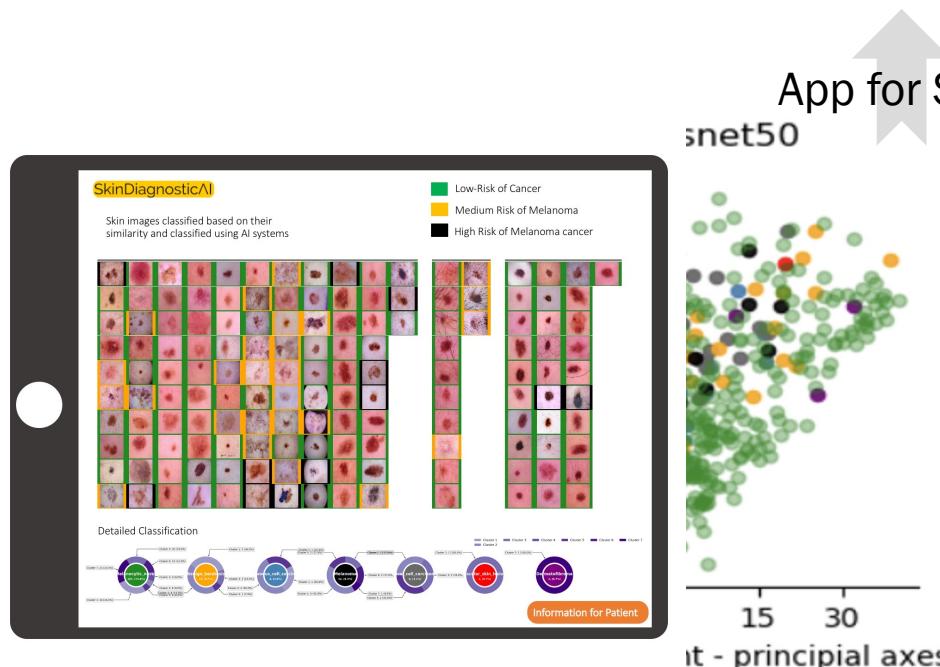
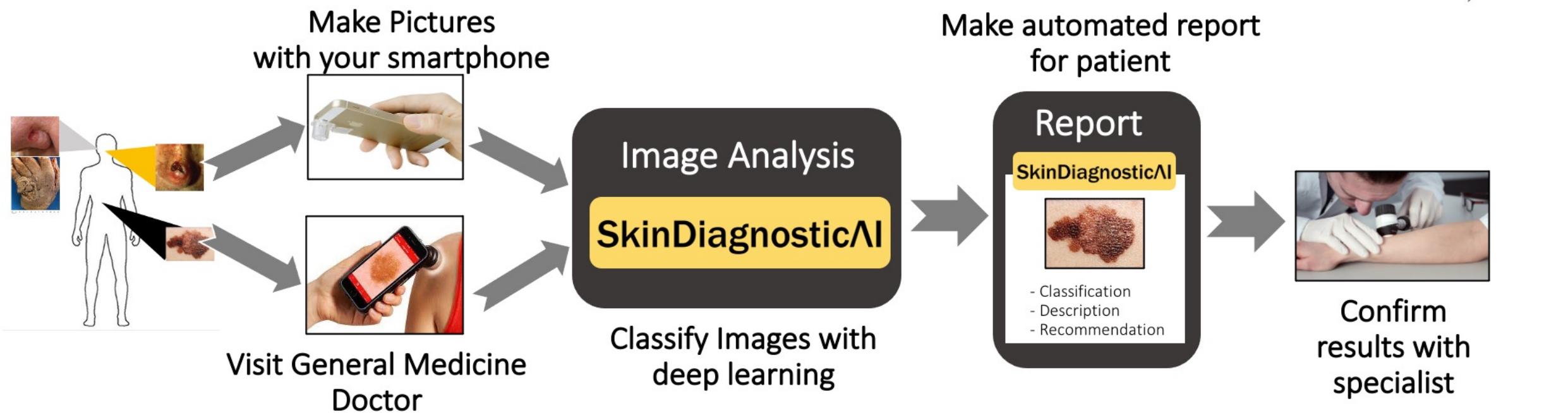
SkinDiagnosticAI

App for Skin Cancer Detection with low-cost devices

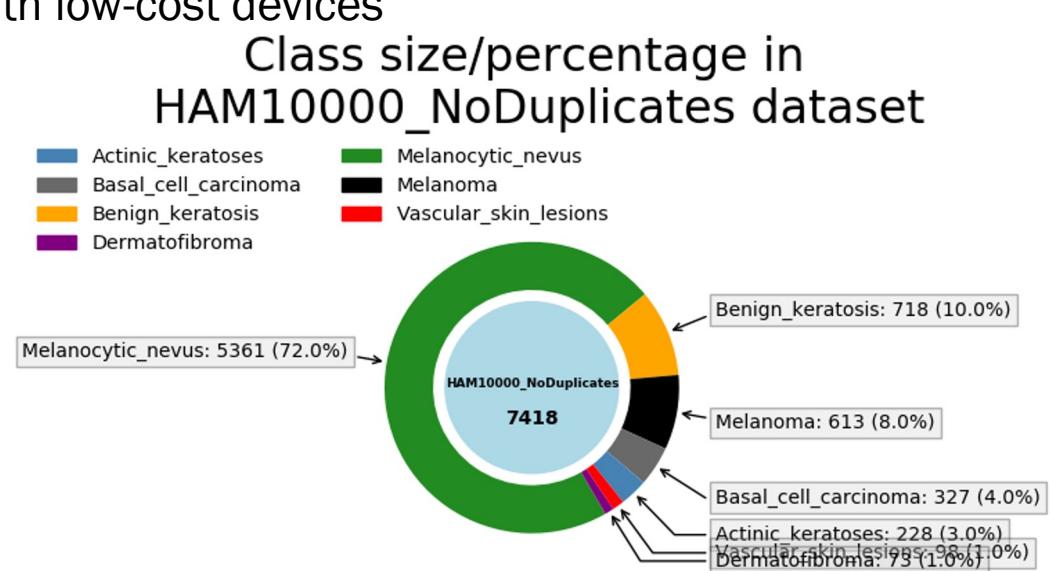
EARLY ON DETECTION
with low-cost devices

GET ACTIONABLE RESULTS
eg: "go to doctor"

VISIT SPECIALIST
If necessary



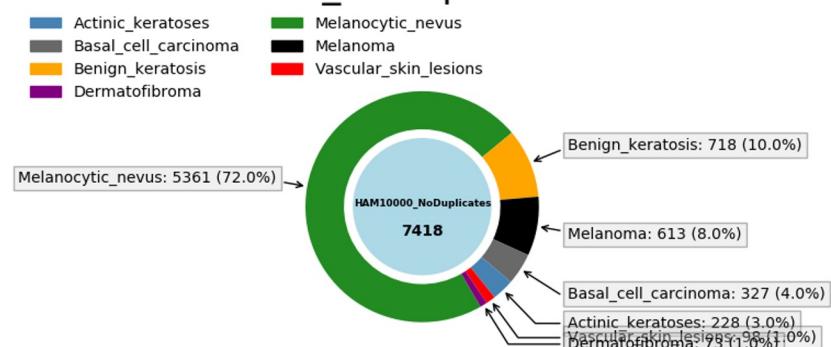
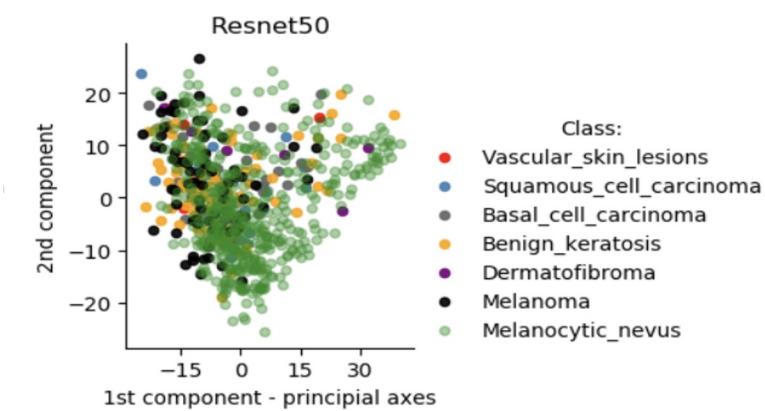
- Class:
- Vascular_skin_lesions
 - Squamous_cell_carcinoma
 - Basal_cell_carcinoma
 - Benign_keratosis
 - Dermatofibroma
 - Melanoma
 - Melanocytic_nevus



PRODUCT IDEA

SkinDiagnosticAI

App for Skin Cancer Detection with low-cost devices



EARLY ON DETECTION with low-cost devices

GET ACTIONABLE RESULTS
eg: “go to doctor”

VISIT SPECIALIST
If necessary

Make Pictures with your smartphone

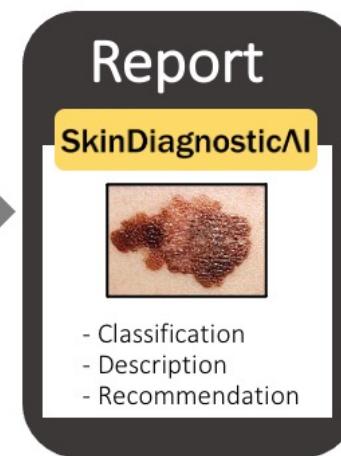


Visit General Medicine Doctor

Image Analysis

Classify Images with deep learning

Make automated report for patient



Confirm results with specialist

Can You Trust to Food Labels ?



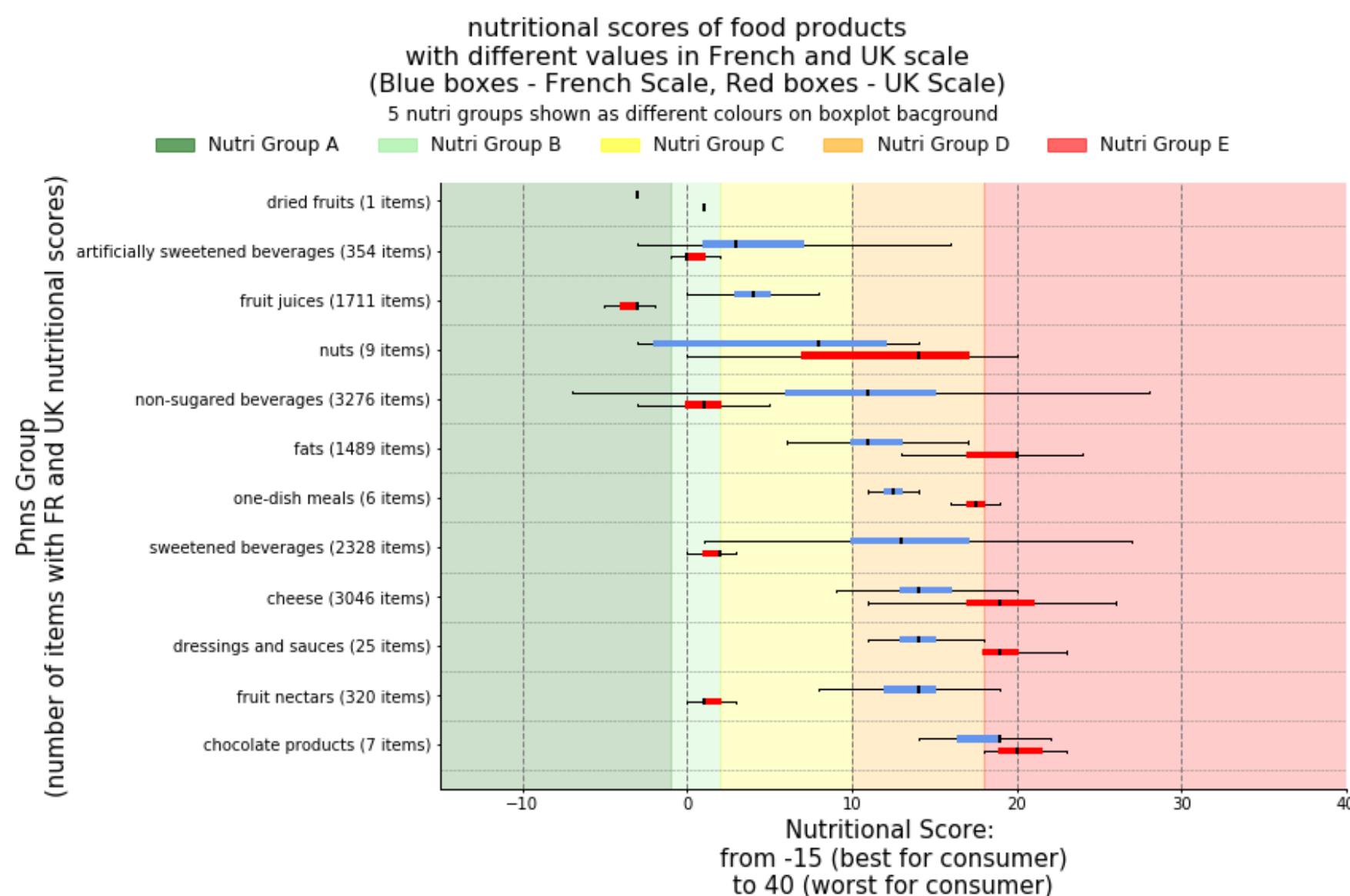
Nutri-Score Informs you how healthy is your food



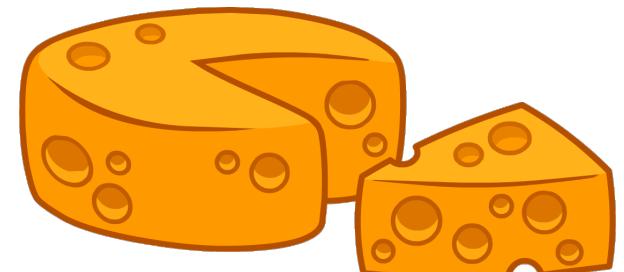
Some countries, use different algorithms

Analysis of 330.000 food products

It revealed that products with different Nutri-scores belong to specific product groups that are consistently showed as more or less healthy in UK or France



Labelled as:



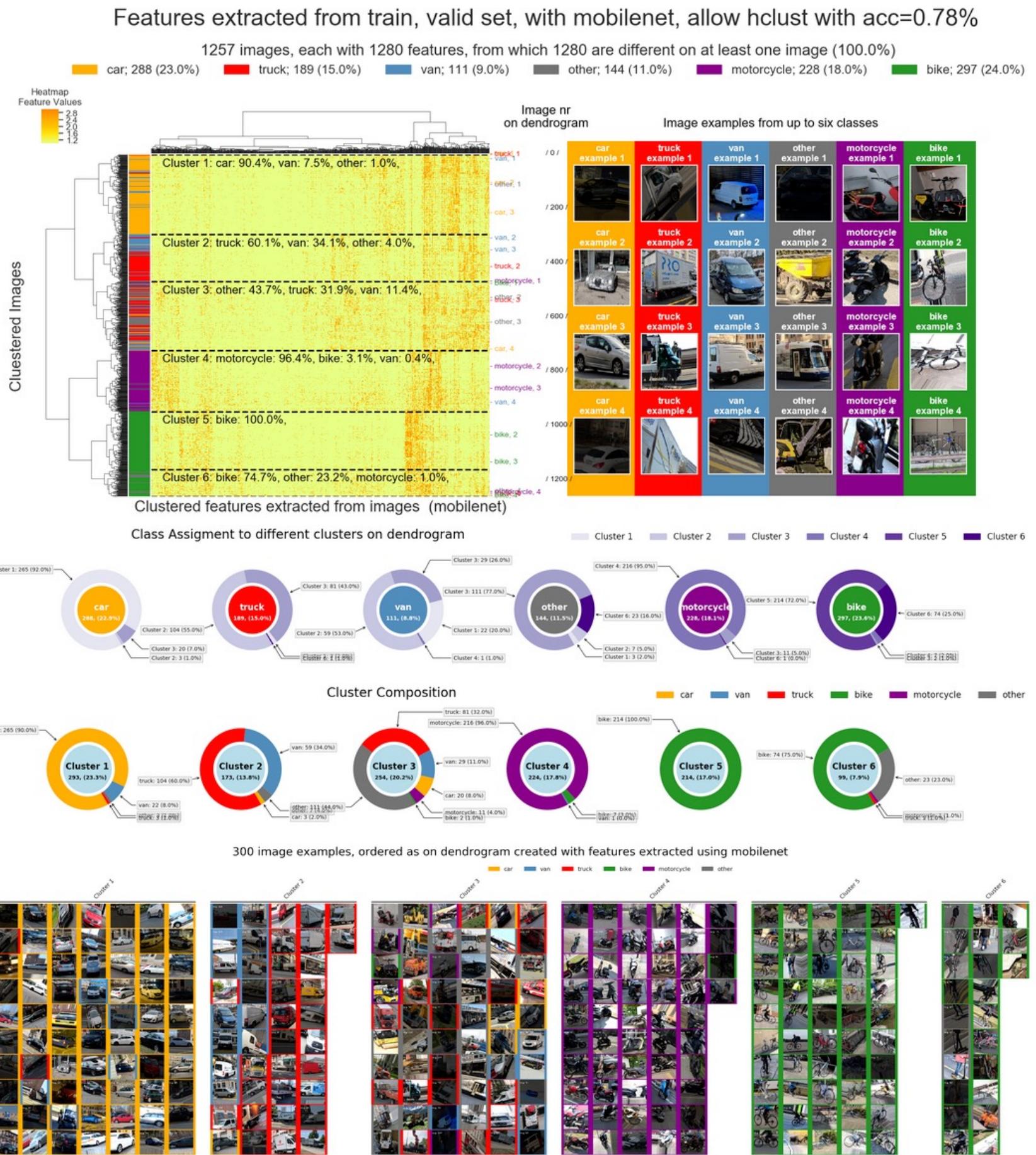
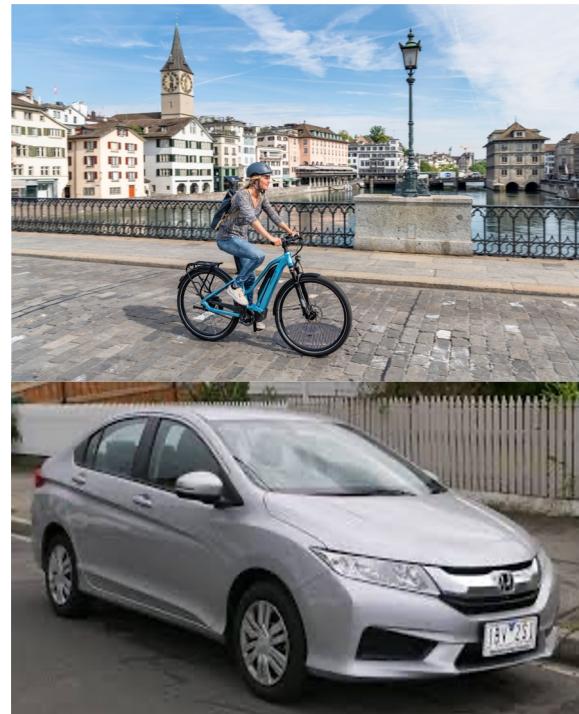
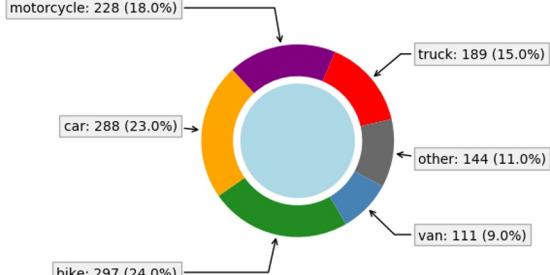
Healthier in France



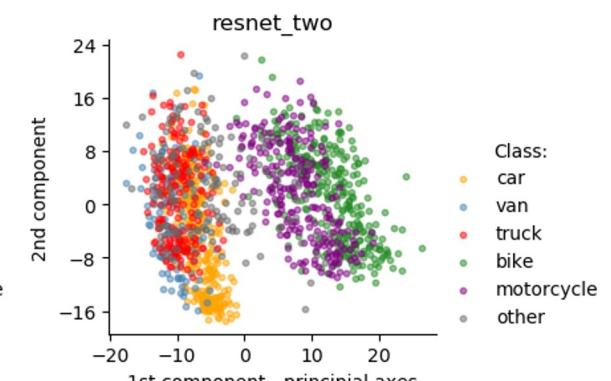
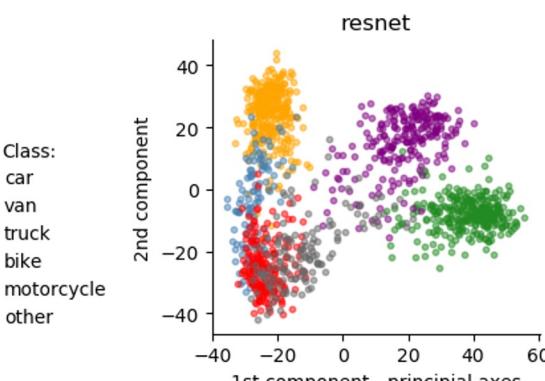
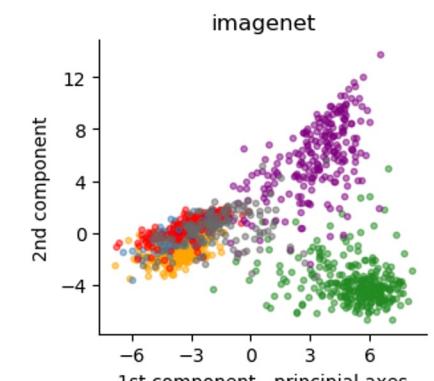
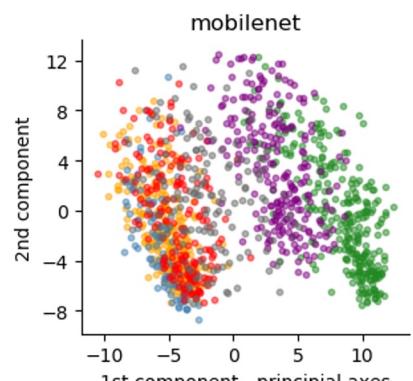
Healthier in UK

Vehicle classification with

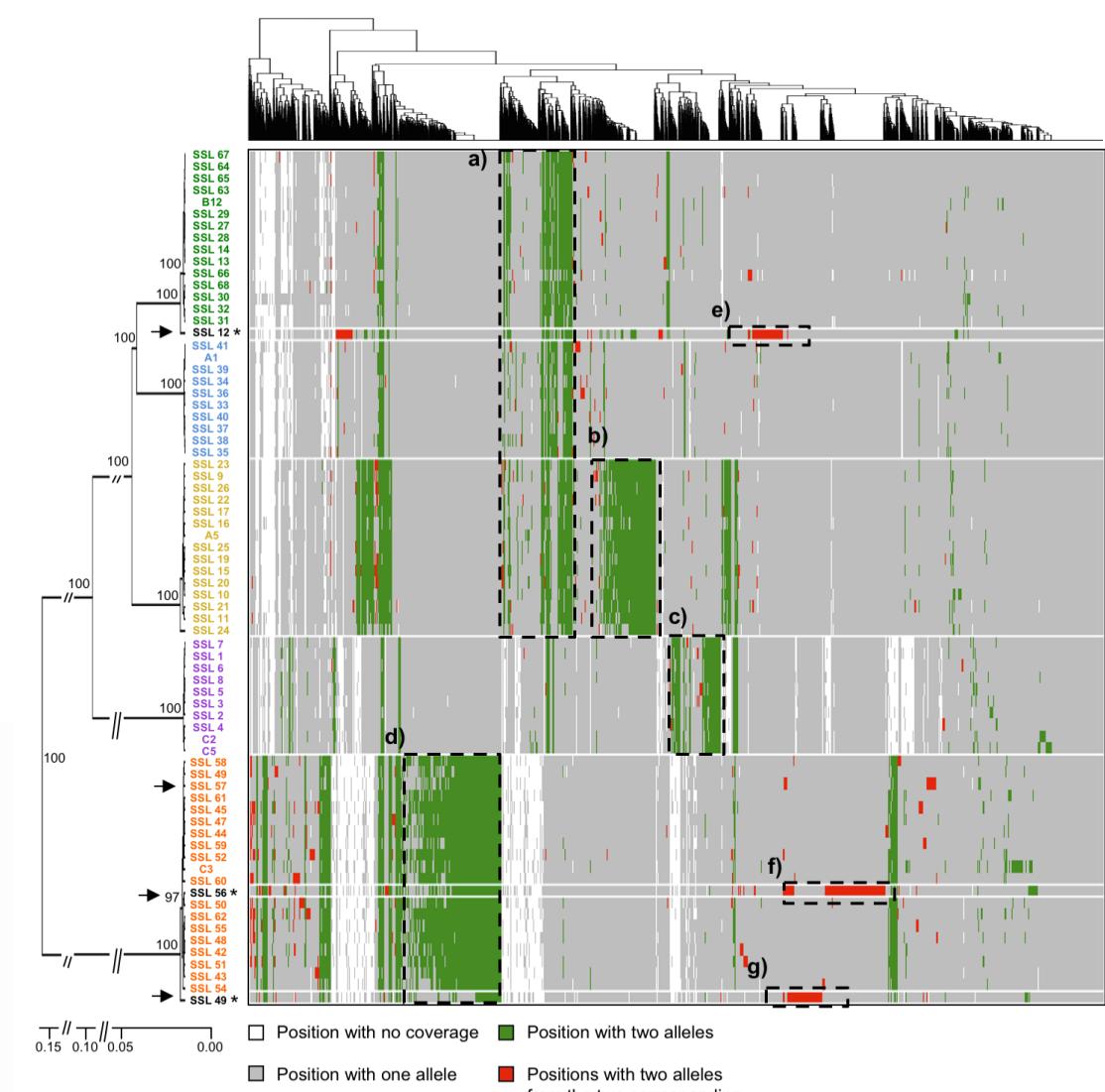
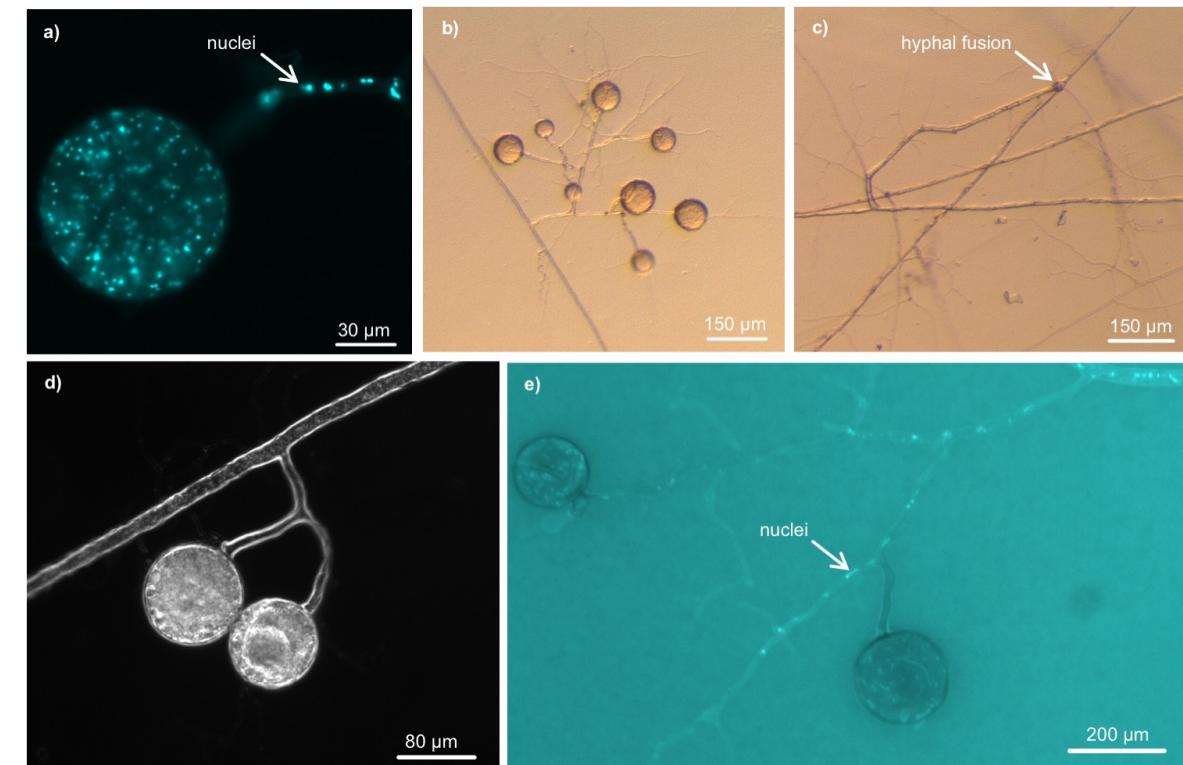
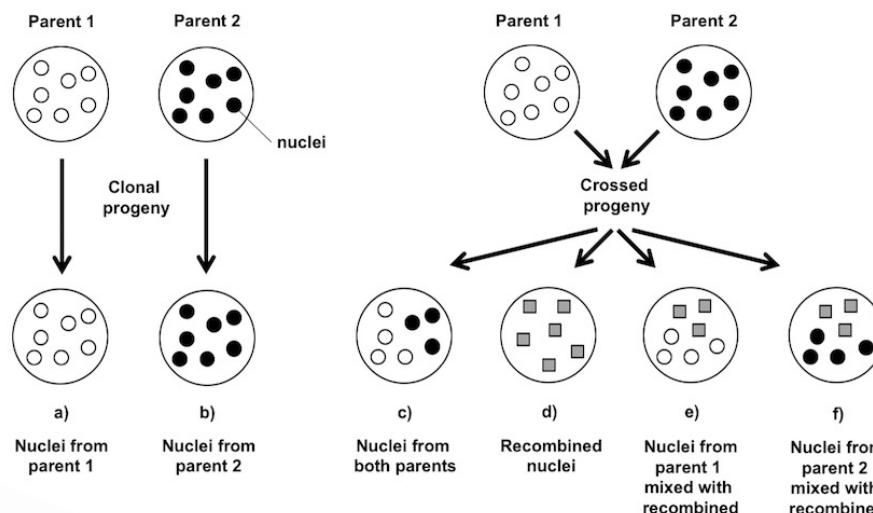
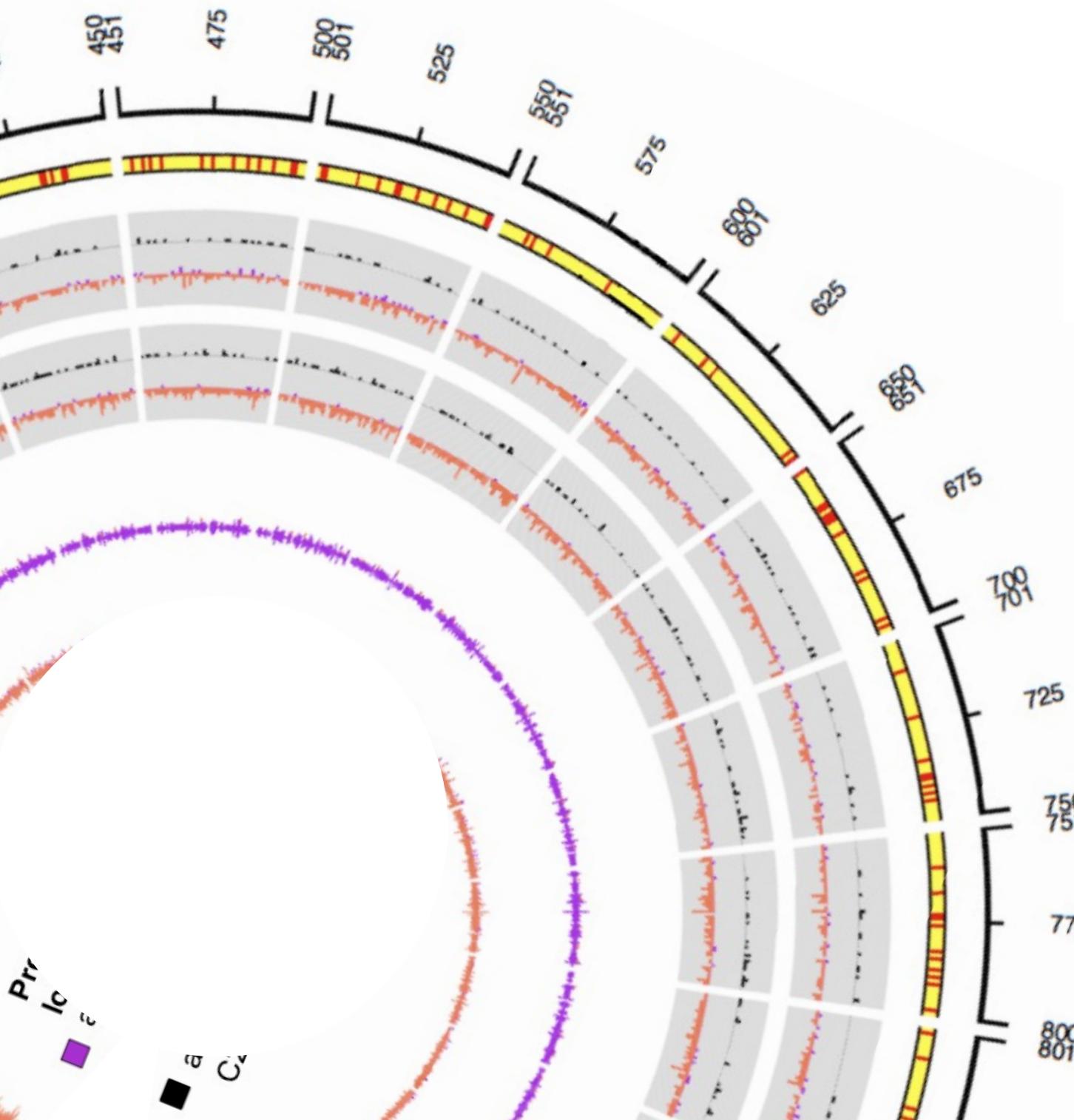
Swissroads Dataset Composition - including augmented images -



PCA: visualization of extracted features using the first two principal components



Production of new Strains Biofertilizer Fungi

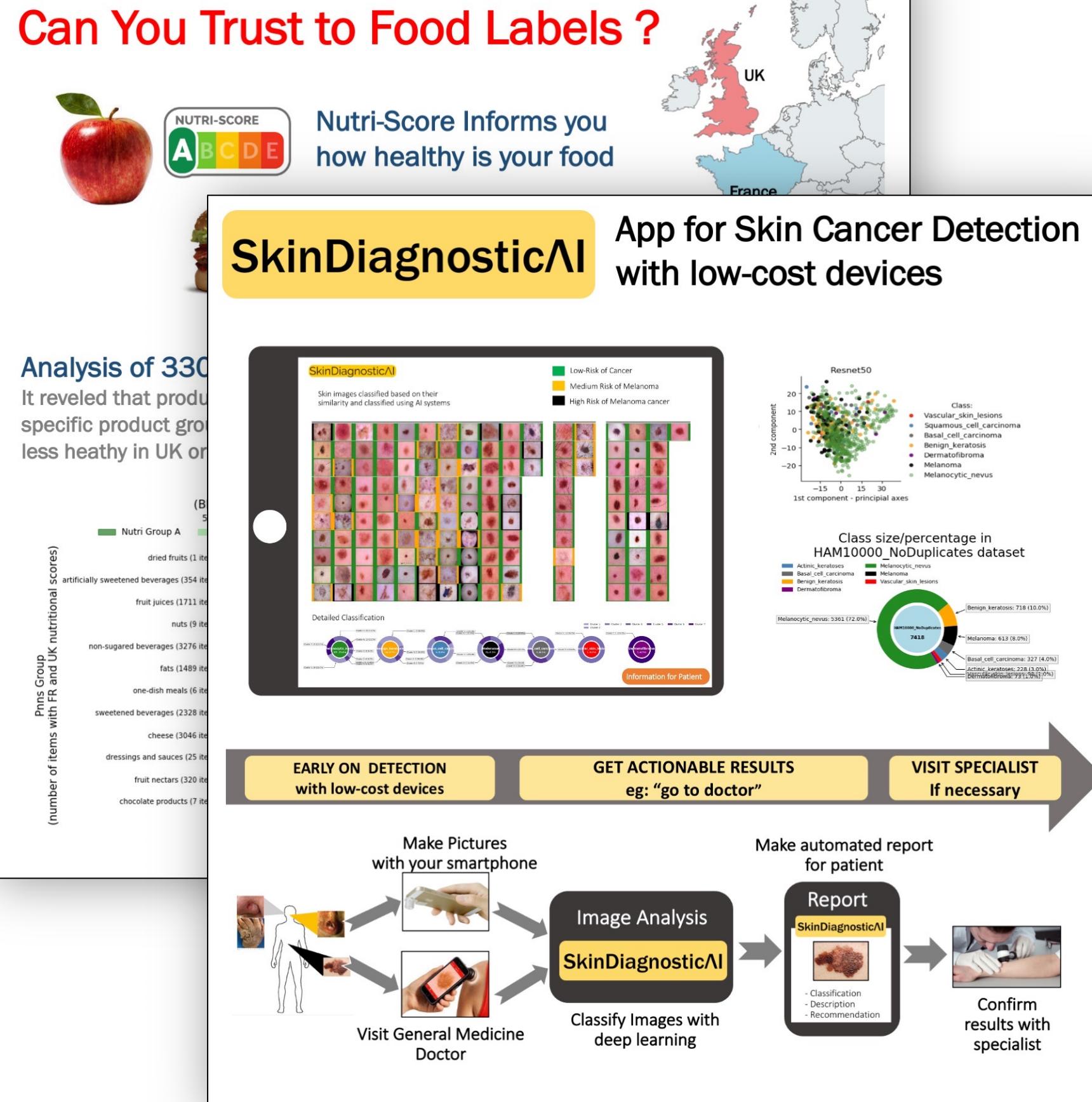
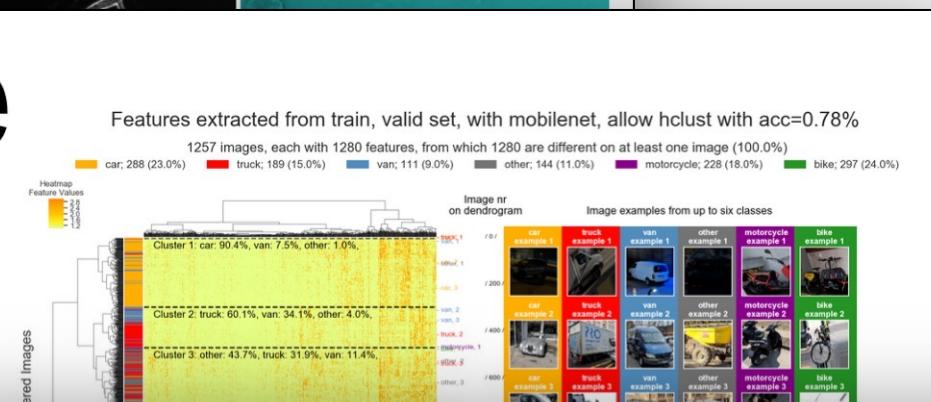
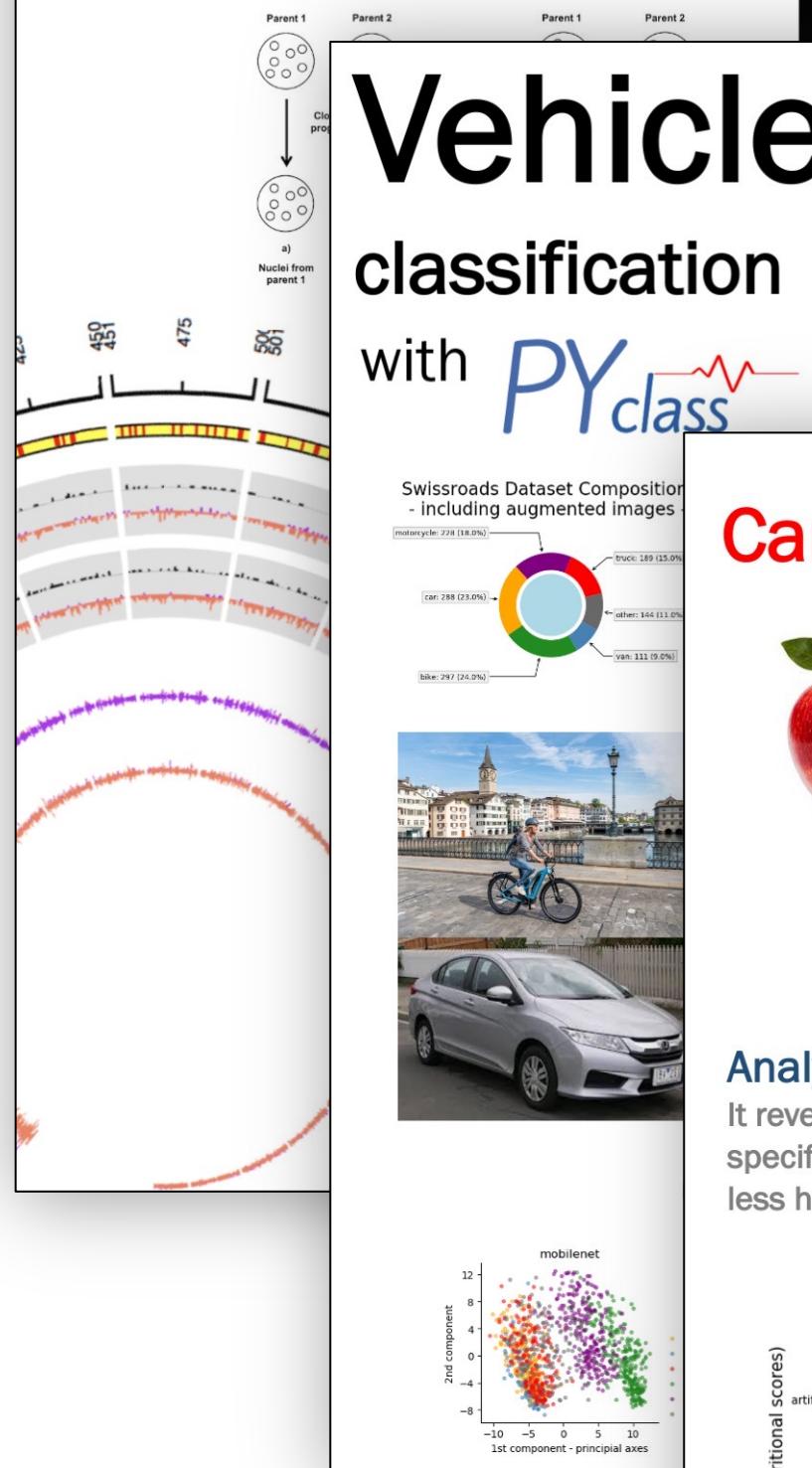
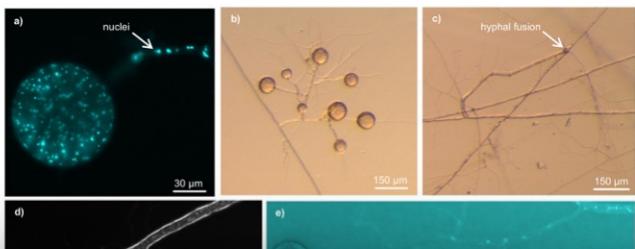


Six different models used to construct simulated data (I-VI)

Clonal lines	Crossed lines
I Clone of parent 1 (p1)	III Admixture of nuclei from both parents
II Clone of parent 2 (p2)	IV Recombined nuclei
	V Recombined nuclei mixed with nuclei from parent 1
	VI Recombined nuclei mixed with nuclei from parent 2

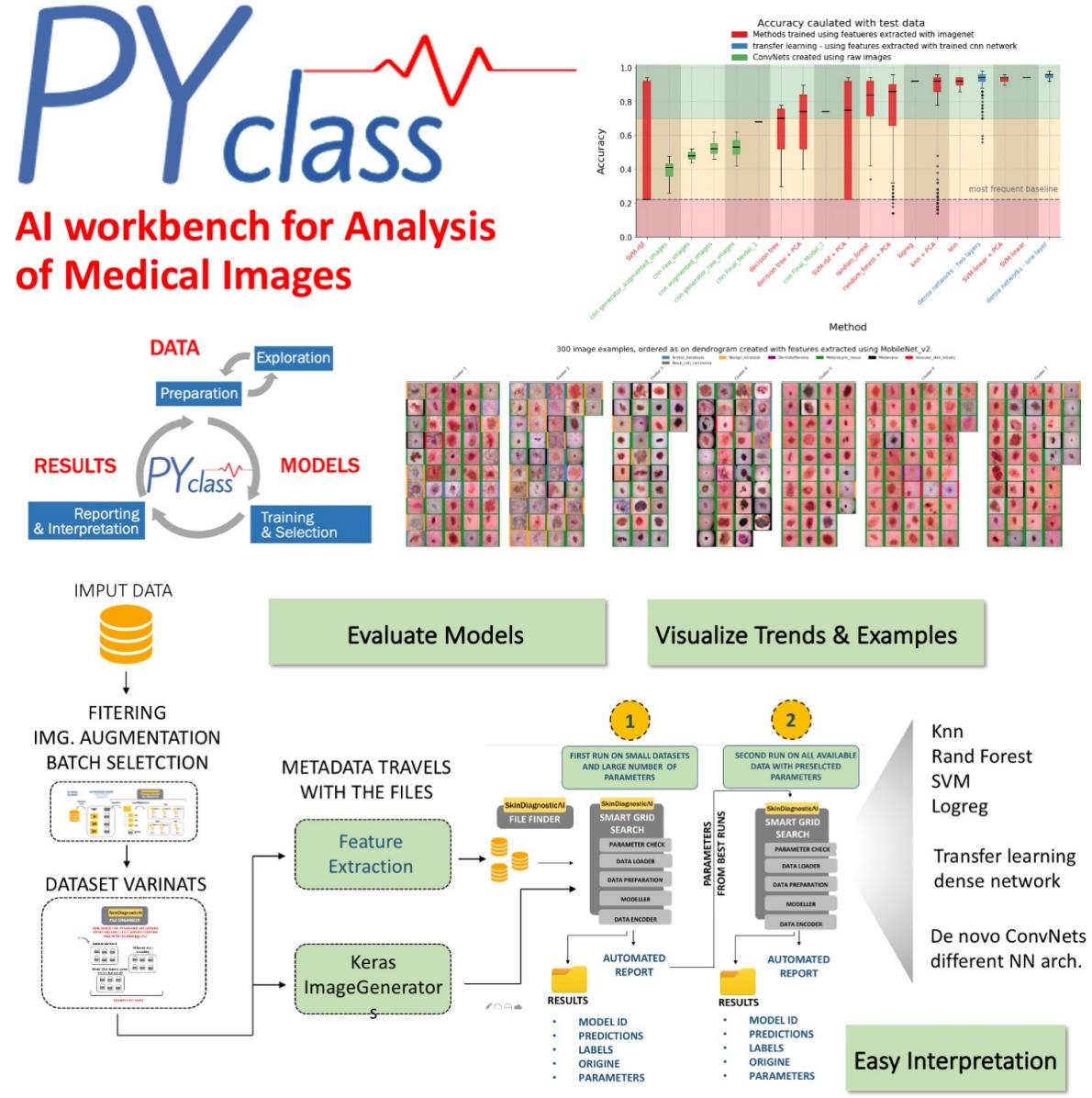
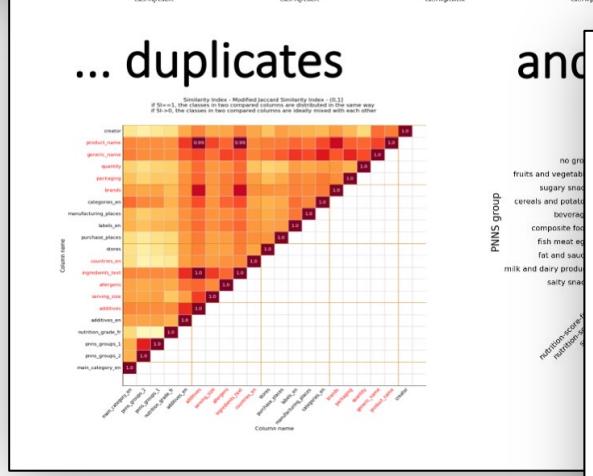
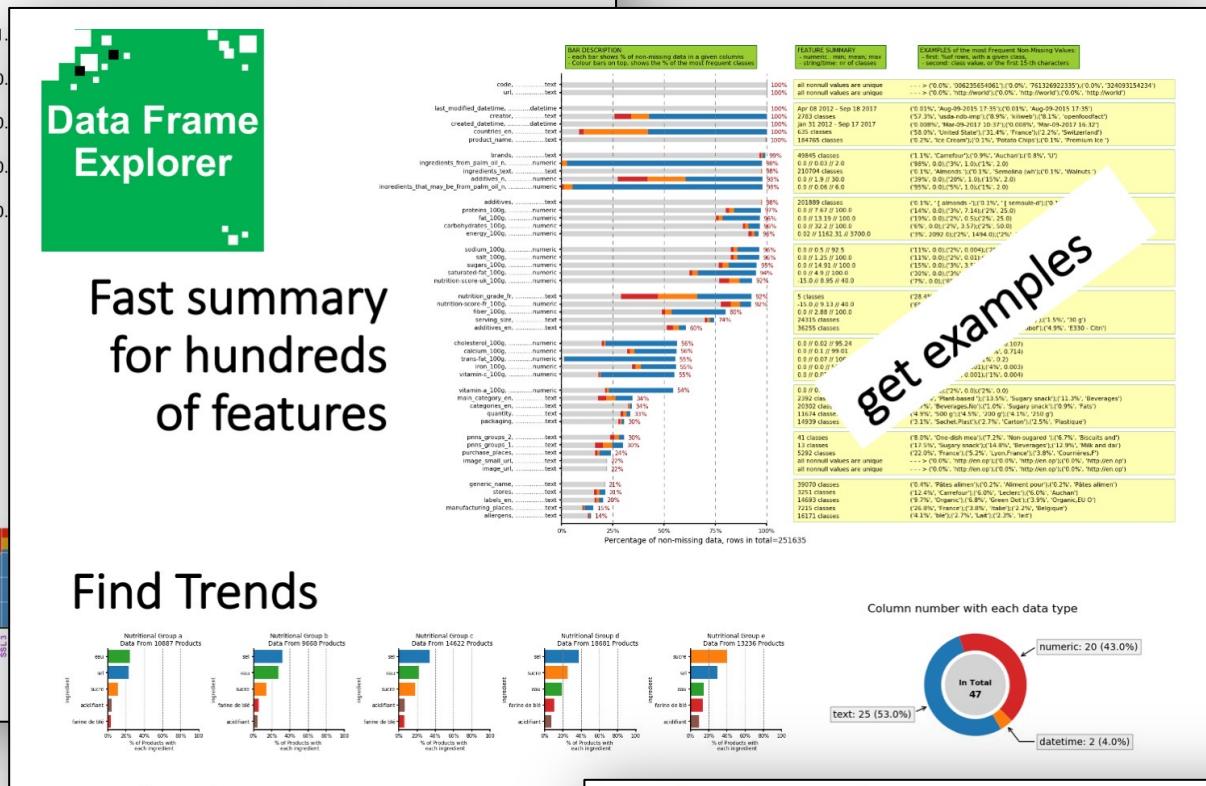
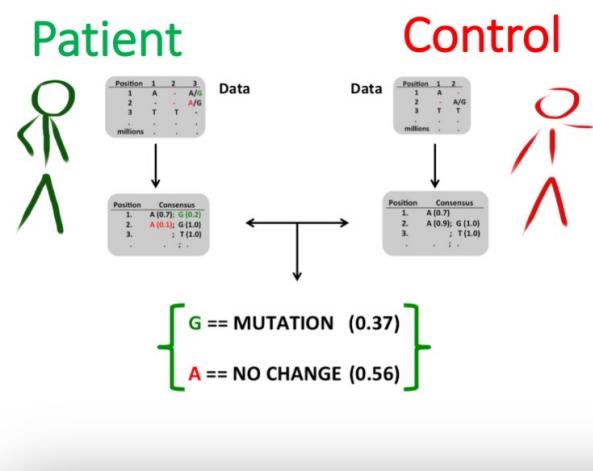
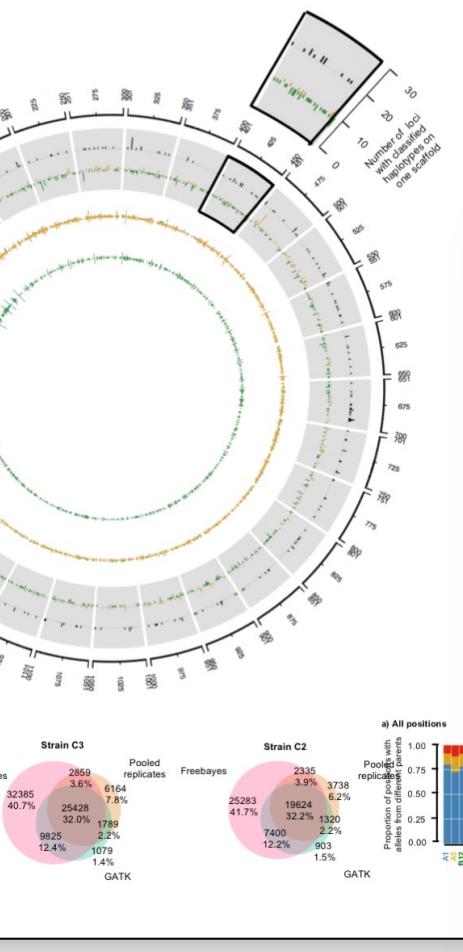


Finding new strains of Microorganisms



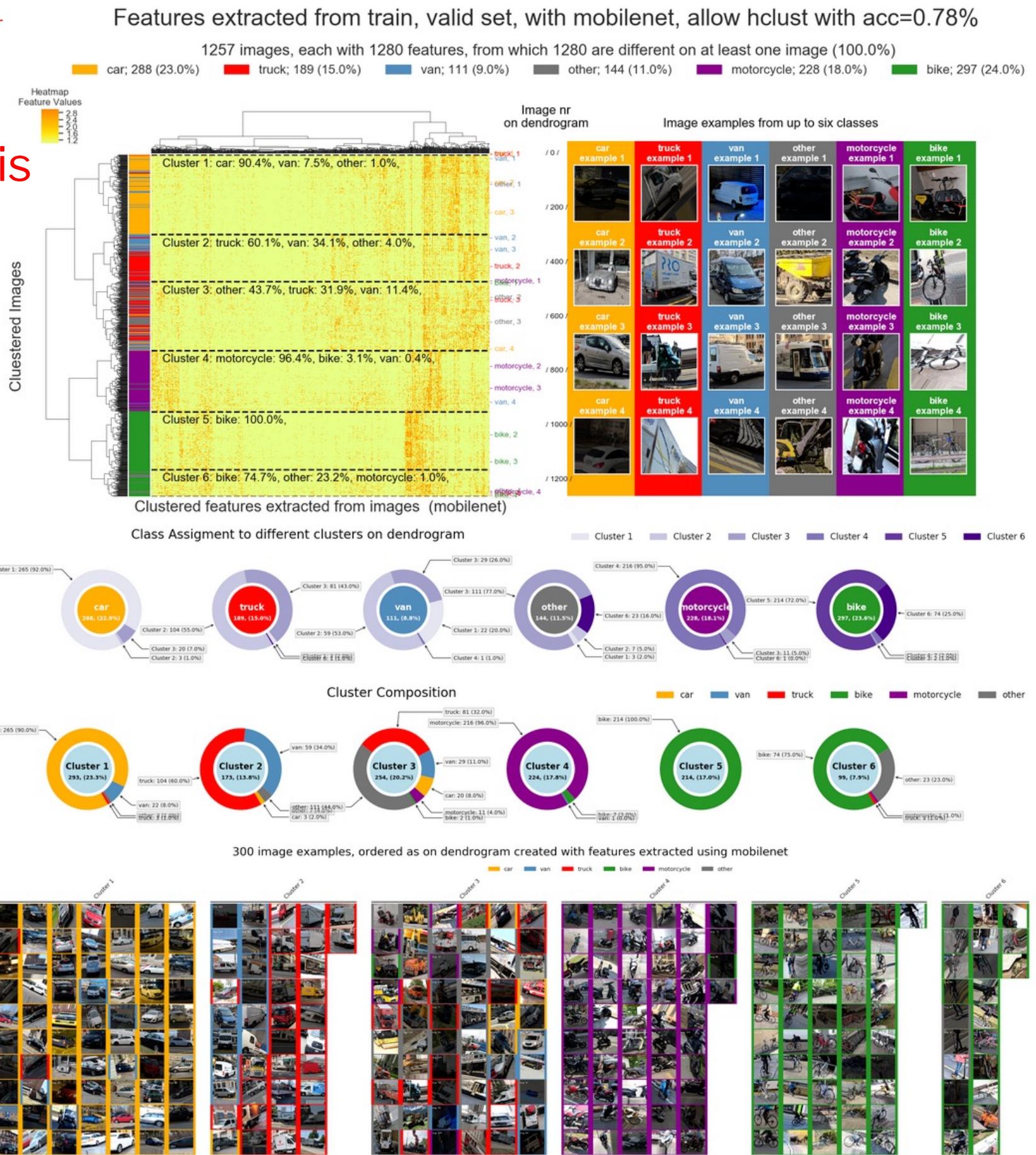
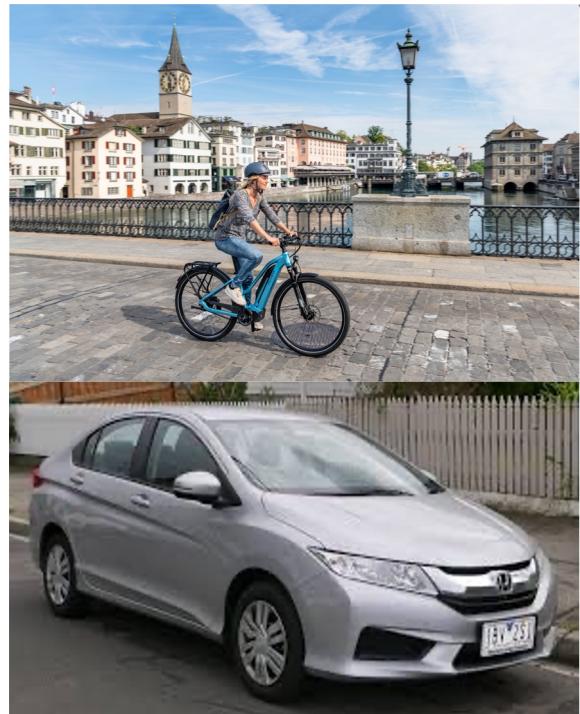
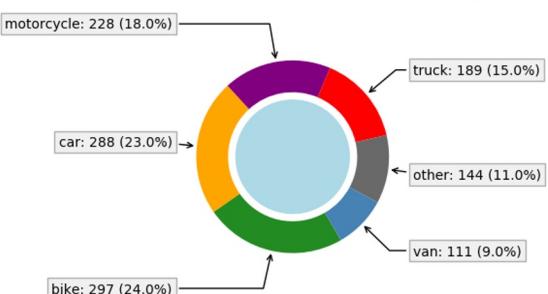


Finds reliable mutations in sequence data

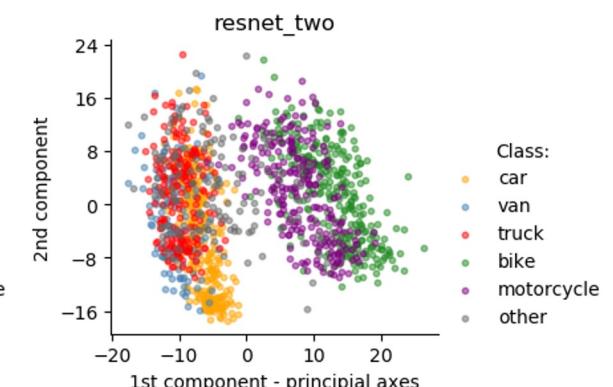
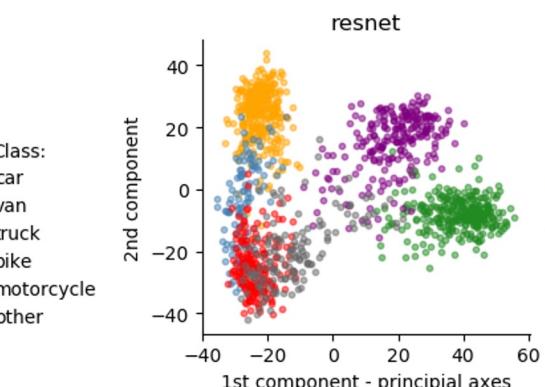
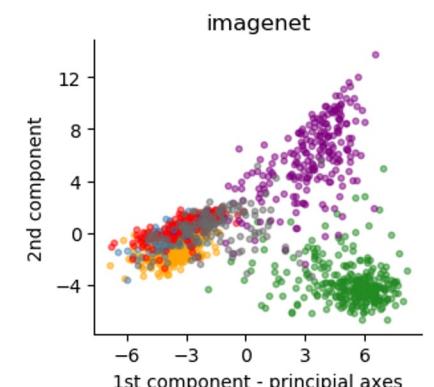
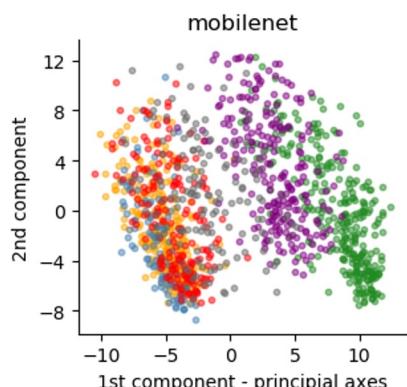


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AI workbench for Analysis of Medical Images

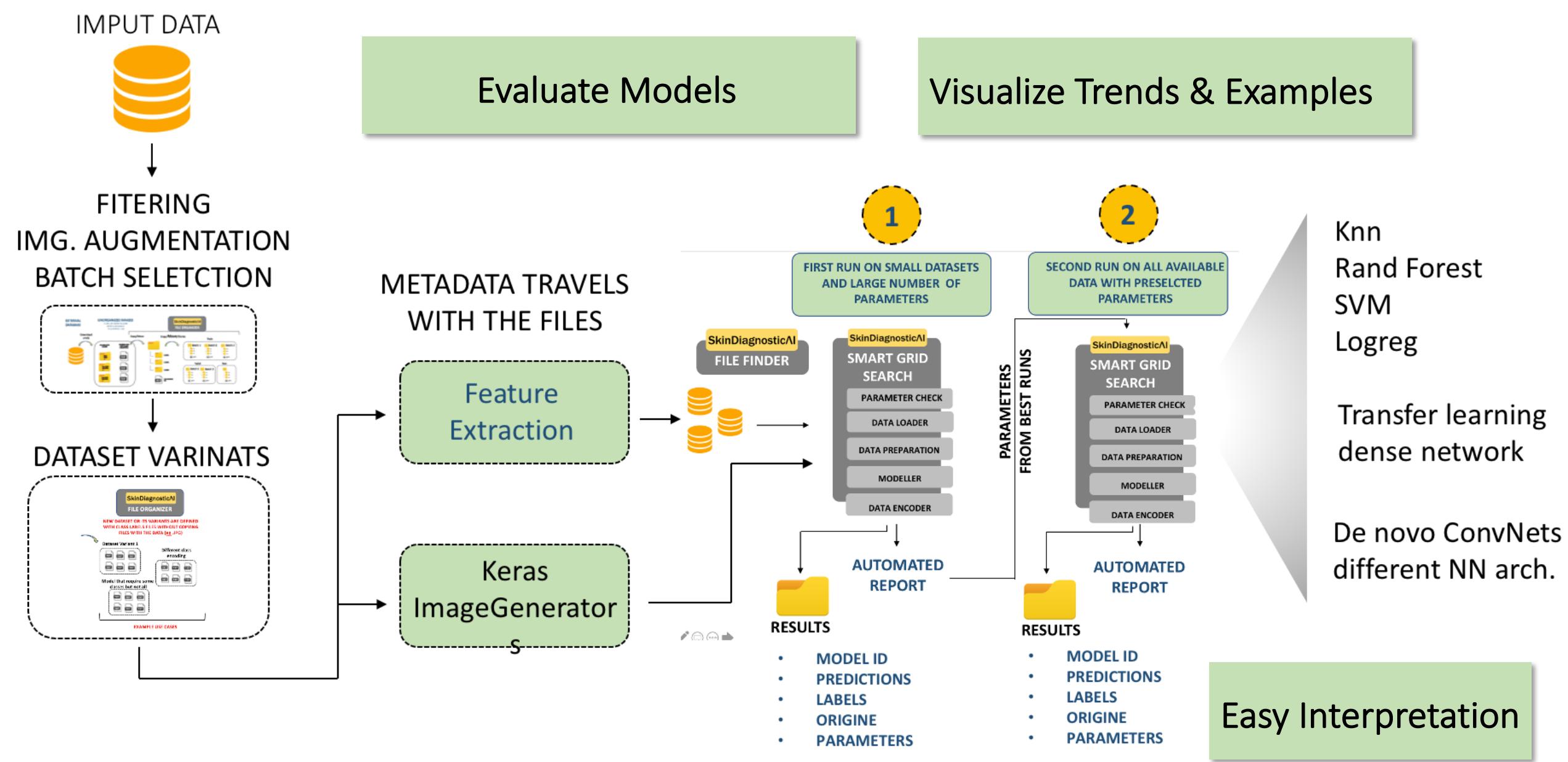
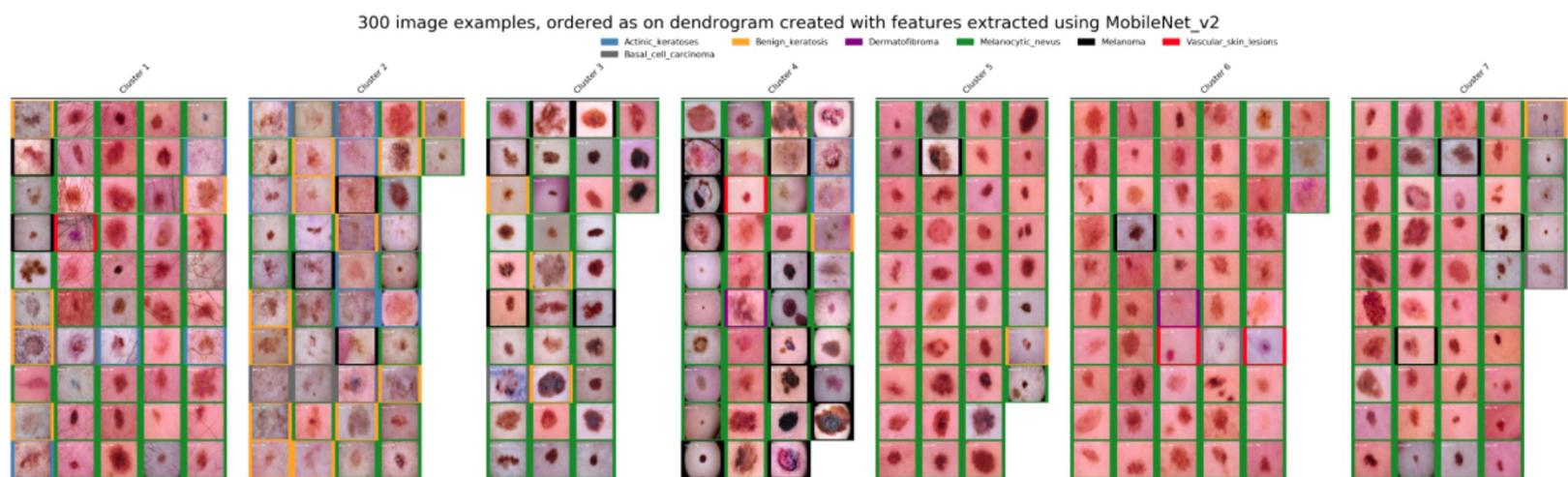
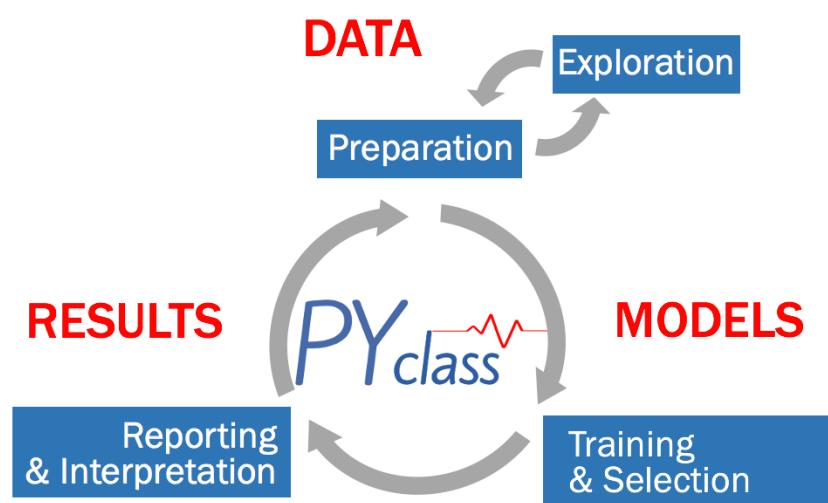
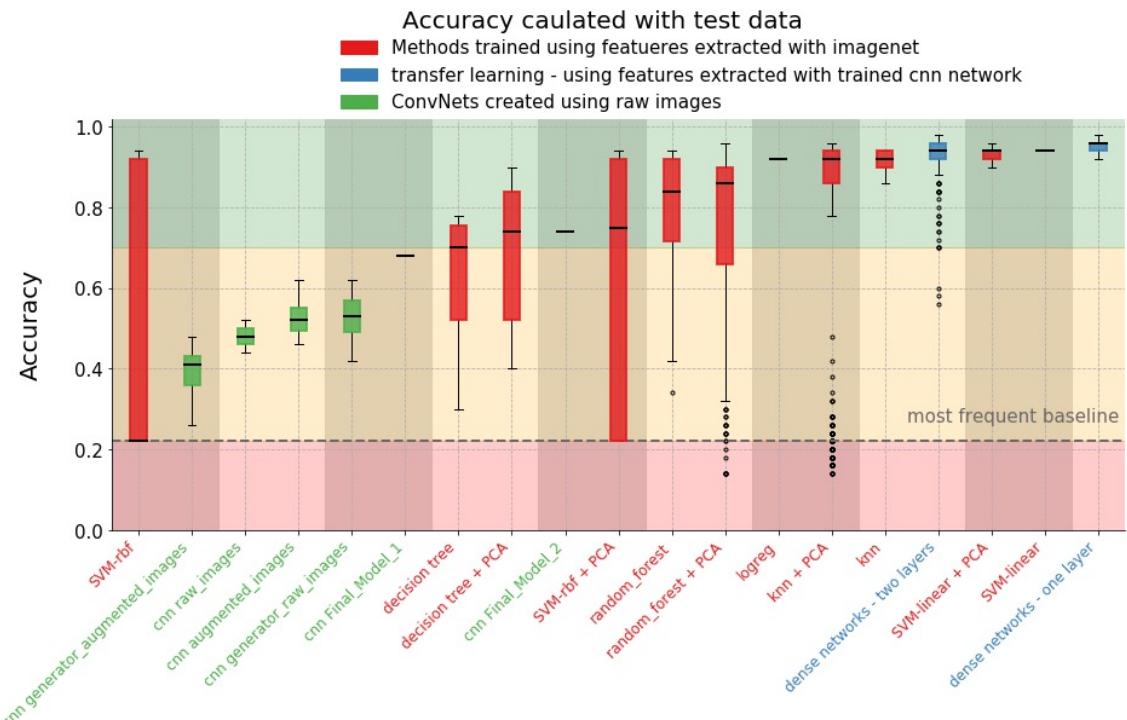


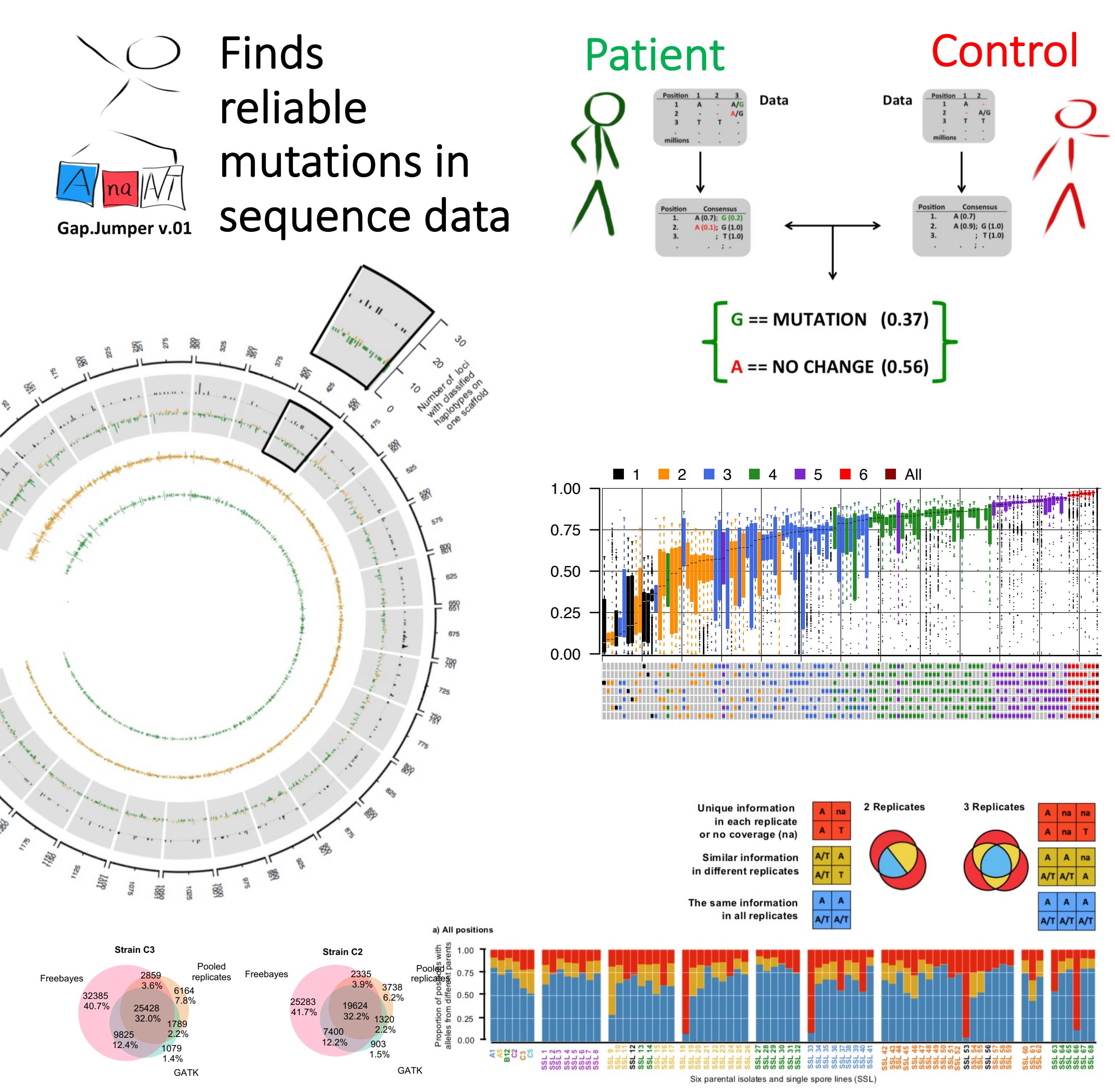
PCA: visualization of extracted features using the first two principal components

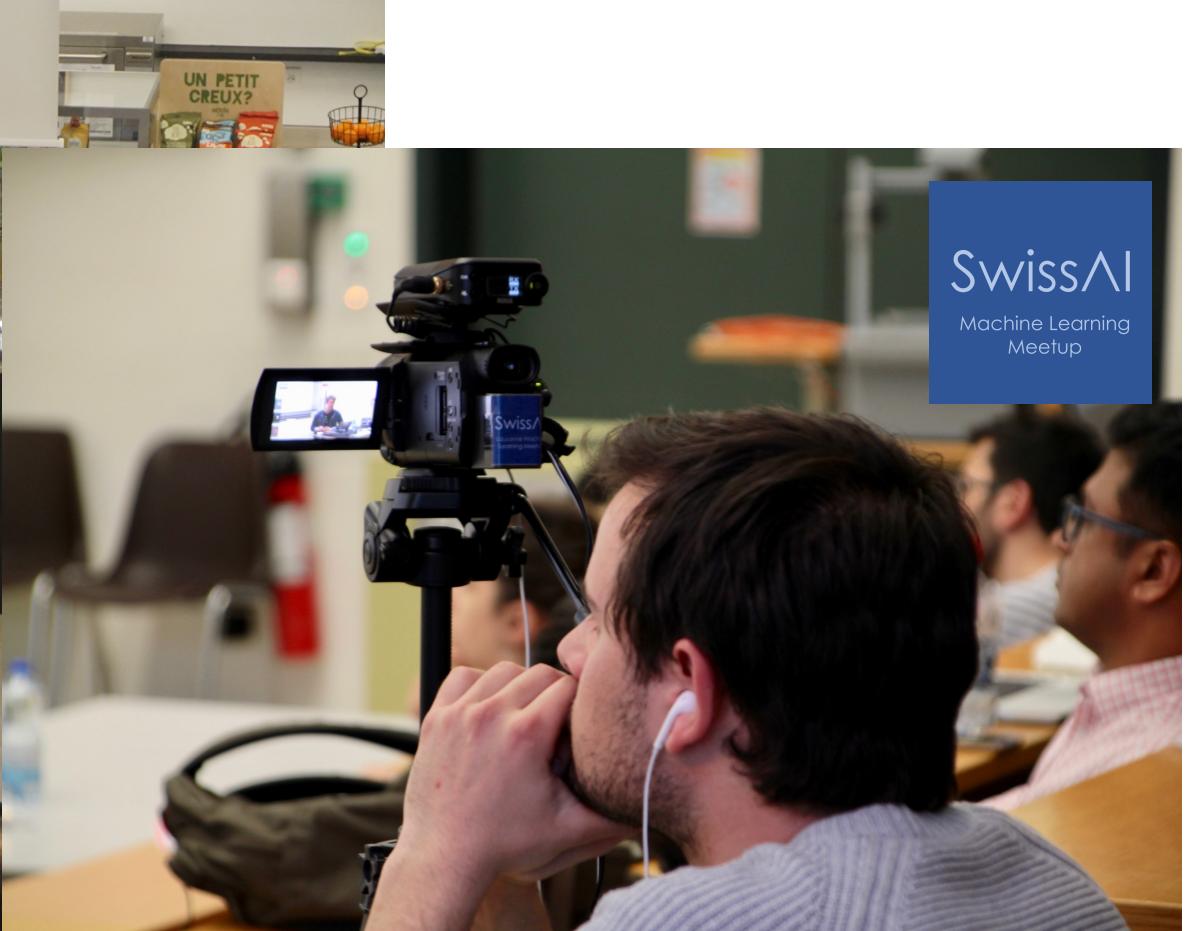


PYclass

AI workbench for Analysis of Medical Images





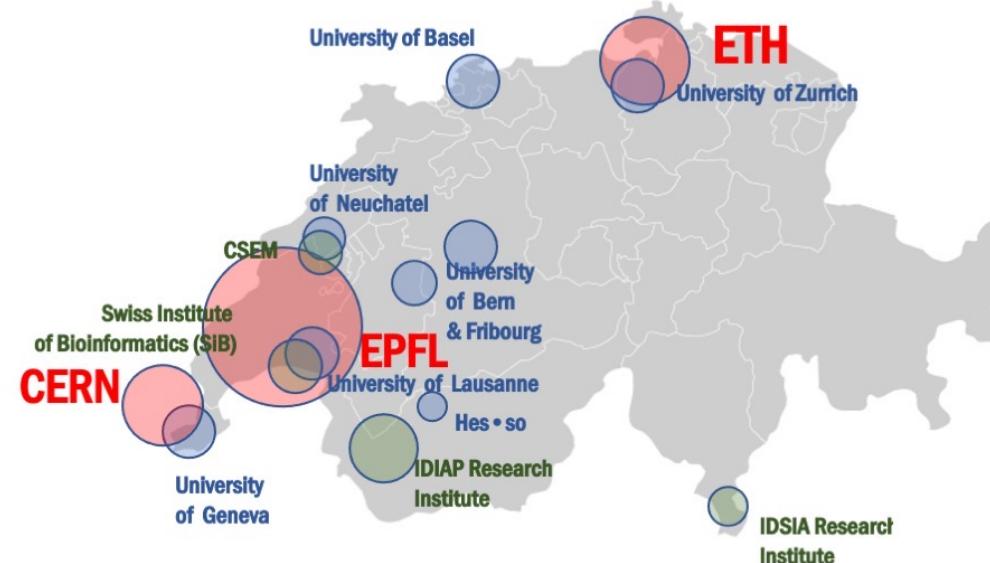


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Swiss AI

Research centers



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